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CANADIAN RED RIVER

AND

ASSINNIBOINE AND SASKATCHEWAN

EXPEDITIONS

VOL. II.

LONDON
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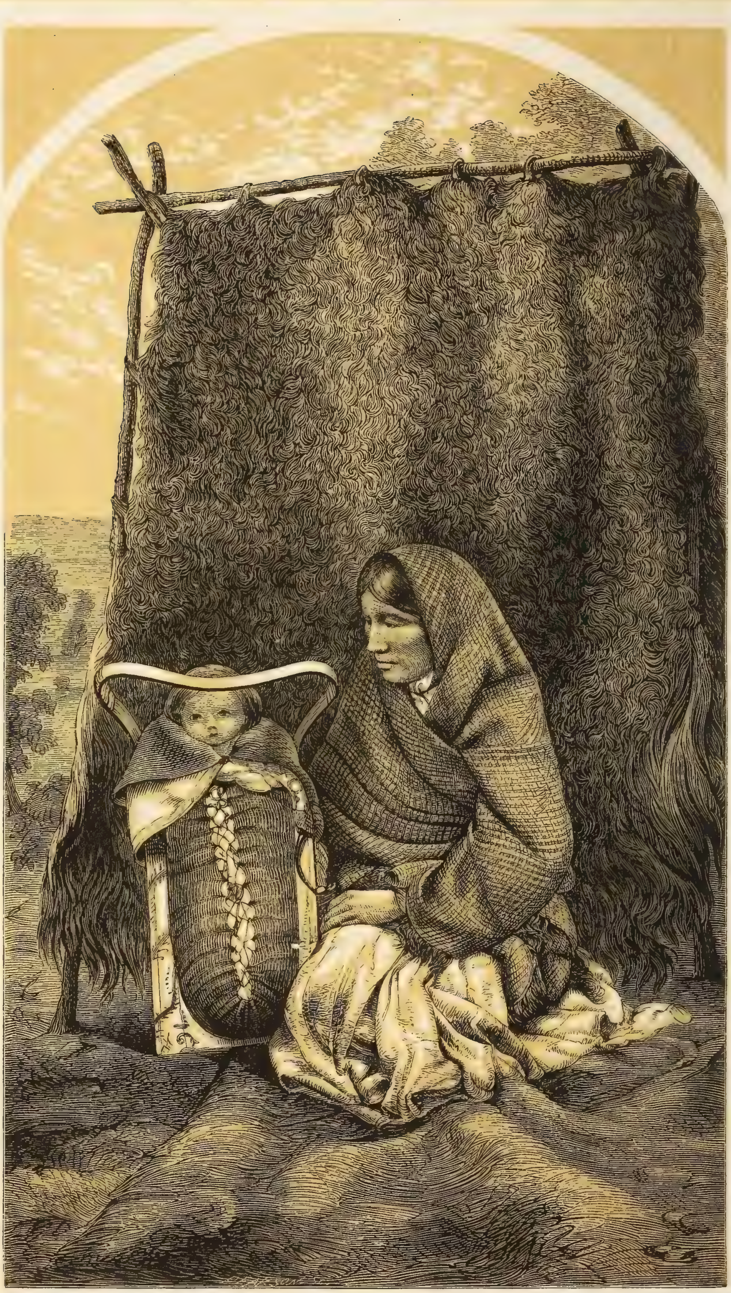

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NARRATIVE

OF

THE CANADIAN RED RIVER

EXPLORING EXPEDITION OF 1857

AND OF THE

ASSINNIBOINE AND SASKATCHEWAN

EXPLORING EXPEDITION OF 1858

BY

HENRY YOULE HIND, M.A. F.R.G.S.

PROFESSOR OF CHEMISTRY AND GEOLOGY IN THE UNIVERSITY OF TRINITY COLLEGE, TORONTO

In Charge of the Assinniboine and Saskatchewan Expedition

In Two Volumes

VOL. II.

LONDON
LONGMAN, GREEN, LONGMAN, AND ROBERTS
1860

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THE

ASSINNIBOINE & SASKATCHEWAN EXPLORING EXPEDITION

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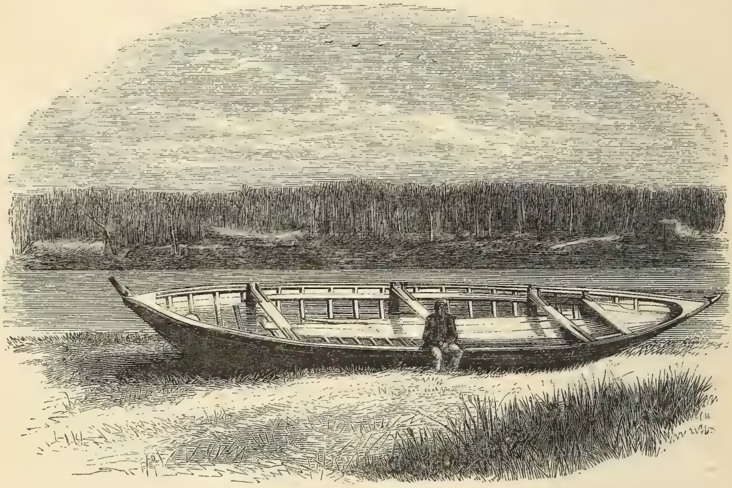
CHAPTER XXIII.

LAKE WINNIPEG.—RED RIVER TO THE LITTLE SASKATCHEWAN.

Mouth of Red River.—Aurora.—Weather Signs.—Channel at the Mouth of Red River.—Storm.—Character of the South Coast of Lake Winnipeg.—Fresh-water Shells.—New Land.—West Coast.—Confervæ.—The Willow Islands.—Clay Cliffs.—Good Land.—Drunken River.—Aurora.—Rock Exposure.—Deer Island.—Section on Deer Island. Equivalent of the Chazy Formation.—Fishing Ground.—Miskena.—Grindstone Point.—Rev. Mr. Brooking.—Rocks at Grindstone Point.—The Little Grindstone Point.—East Coast of Lake Winnipeg.—Punk Island.—Yellow Ochre.—Coast near Dog's Head.—Limestone Cave Point.—Fissured Rocks.—Jack Fish River.—Fisher Bay.—The Cat Head.—Little Saskatchewan Bay.—East Coast of Lake Winnipeg.—Dimensions of Lake Winnipeg.—Elevation and Distance of the Lake Superior Watershed.—Elevation of the Mississippi Watershed.

The early period of the year during which the arrival of winter may be expected to close the navigation of the lakes and rivers of Rupert's Land, makes every autumnal day valuable for continuing an exploration in canoes or batteaux. A fortnight, however, after our return from the prairies was necessarily occupied at what may be appropriately termed Selkirk Settlement, in writing reports and making preparations for a voyage through Lake Winnipeg, the Little Saskatchewan River, and Lake Manitobah to the Salt Region on the shores of Winnipego-sis Lake. Mr. Dickinson prepared for an exploration of the country between the Lake of the Woods and Red River, and between the Assinniboine and the 49th parallel. Both parties were ready by the 18th, and at noon started on their respective routes.



Freighter's Boat.

In a Red River freighter's boat of four tons' burden, with a crew of seven men, and accompanied by Mr. Fleming, I reached a point about seven miles below the Indian Settlement, being aided by a fair wind, and camped at dusk. On the following morning, the temperature of the air at sunrise was 63°, of the river, 59°. We arrived at the mouth of the river at 10 A.M., and hastened to avail

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ourselves of a south-east wind just beginning to rise. Last night the aurora was very beautiful, and extended far beyond the zenith, leading the voyageurs to predict a windy day. The notion prevails with them that when the aurora is low, the following day will be calm; when high, stormy. The temperature of the mouth of the river was 59°, and of the open lake, 1½ mile from shore, 58½°. Rain commenced as soon as we were fairly in Lake Winnipeg *, the wind suddenly chopped round to the north, driving a dense fog before it, and in a few minutes enveloped us in a misty shower. The steersman instantly turned about and made for the mouth of the river, there being no harbour nearer than the Willow Islands, at least fifteen miles distant. The breeze rapidly increased to a gale as we regained calm water inside the bar at the mouth of Red River.

The wind subsided about 2 P.M., and a shot heard from a direction due south of where we lay, induced some of the voyageurs to exclaim, that the wind would soon come from that direction, according to an impression common among these excellent observers and interpreters of "signs," that a shot heard against the wind is a good omen. But our steersman placed more faith in the aurora, and thought we had not "taken all the wind out of it yet." The sky having a threatening appearance, we determined to camp.

There are six mouths to Red River, winding through extensive marshes; the channel through which we passed was the main outlet; its breadth varies from twenty to twenty-eight feet, and on either side shelves rapidly from four to eighteen feet of water. At 3 P.M., when just on

---

* Winnipeg, from the Ojibway—*We*, dirty; and *nepe*, water.

the point of starting, one of the voyageurs suggested that we should wait for a few minutes longer as he had observed the water of the lake coming in at the mouth of the river, and thought that the wind would soon blow strong from the north, although at the time the sky was clear and a calm prevailed. In less than half an hour a fresh northerly breeze sprang up, scud appeared drifting before it, and the waters of the lake flowed rapidly up the river into the vast marshes which extend for many miles inland at the southern extremity of Lake Winnipeg. The weather at this season of the year is very changeable, and renders boat navigation of the lake rather hazardous. In anticipation of a storm, we made ourselves as comfortable as circumstances would permit on a low spit of sand, with the lake before us, the river on our left hand, and interminable marshes east and south of us.

Soon after sunset, the breeze from the north rose into a gale; the water of the lake ran like a rapid up the river channel into the swamps, and a terrific swell soon set in from the lake, breaking upon the sandy beach with a stunning noise. The water rose to within six inches of the level of the spit on which our tent was pitched and threatened every instant to submerge it. At 10 P.M., the gale was at its height, and as we sat upon a stranded trunk of a tree, looking out upon the lake, a truly magnificent scene lay before us. Huge crested breakers covered the lake as far as we could see through the gloom, lighting up the coast with long glistening streaks of white foam. The noise was so overpowering that we had great difficulty in hearing one another speak; the waves broke over the narrow spit which formed the low bank of the river where our boat was moored and the tent pitched; our camp ground was reduced to a strip of sand eight yards broad and seven inches above the river on one side, with overflowing swamps on the other; if the storm had continued half an hour longer we should have been compelled to take to the boat and drift into the reeds, at the risk of being stranded when the gale subsided and the water retired from the marshes into the lake.

Beach of Lake Winnipeg, near the Mouths of Red River.

For many miles the south coast of Lake Winnipeg consists of alternate strips of sand sustaining willows, and narrow, reedy marshes running parallel to the coast line. Some of these sand strips show many years of duration when well protected by drift timber, others are of recent origin, clean and bare, enclosing ponds in which rushes are only just beginning to show themselves. They are the records of the progress made by new land in its invasion of the lake at and near the mouths of Red River. A northerly gale throws up a bar or beach about one hundred yards from the main shore; on the new beach drifted timber accumulates, and in process of time becomes consolidated by the gravel and sand which is washed between the logs. Willows soon grow on the new soil thus formed, and bind the whole into a firm beach with a marsh in the rear. A heavy gale may sweep the new land away or throw up another beach about one hundred yards in advance of it, on which the process of consolidation is renewed. For ages past this work of construction and destruction has been greatly in favour of the former. Hence it arises that, with the exception of the newly formed spit at the mouth of the river, there is no accessible camping ground for several miles up the stream; marshes surround the spits or old beaches on which the willows grow, and extend in all directions as far as the eye can reach.

The beach and marshes contain an infinite number of fresh-water shells belonging to the genera *Helix*, *Bulimus*, *Succinea*, *Pupa*, *Planorbis*, *Lymneus*, &c. &c. For many hundred yards together the beach is covered with perfect or disintegrated forms of these shells, thrown up by the waves upon the sand.

We employed ourselves during our unexpected detention in examining the coast, sounding the river, and in shooting and fishing. Our sporting brought us only six duck, three plover, and three large pike. The flesh of the pike was of a delicate salmon colour, more like that of the salmon trout of the Canadian lakes than of the common pike.

Sept. 21*st.*—Rising at 4 A. M. in half an hour we were *en route*, the morning just beginning to dawn; temperature of the air at sunrise, 51°, of lake 59°. The west coast for a few miles is elevated from five to six feet above the lake; here and there a low beach of limestone gravel, sand, and a few granite boulders, is fringed with a belt of tall aspens which grow within twenty feet of the water's edge. Behind the belt of aspens is a marsh, then another belt of aspens also followed by a marsh. This succession continues for a distance of about three miles before good land supporting heavy aspens is to be found in large areas. Near to the spot where we breakfasted, an excellent illustration of the prevailing character of the west coast, thus far, occurs. A sandy beach covered with shingle had separated a former bay from the main body of the lake. On this beach, which was not twenty feet broad, or more than five above the lake level, willows, dogwood, and grasses were growing; a large pond lay inside, fringed with rushes; it was tenanted by hosts of duck. In the rear of this pond a narrow strip of land clothed with aspen, separated a marsh from it, which had doubtless once been a bay of the lake, then a pond, and finally a marsh.

At 11 A. M., a vast quantity of confervæ appeared in clusters on the surface of the lake, resembling in every particular a similar organism noticed in extraordinary profusion on the Lake of the Woods in August, 1857. The sudden appearance of this "weed," indicated a calm, according to the experience of our voyageurs. A calm did occur for a short time, soon, however, followed by rain in the north, which fortunately did not reach us.

Inland ponds cut off from the lake by low beaches appear as far as the Willow Islands, where we arrived in the afternoon. These islands were found to consist of a few small sandy areas and one long narrow strip of sand

and gravel, stretching into the lake in an easterly direction, and separated from the shore by a narrow channel. They are fast wearing away, and in the memory of some of the voyageurs, were covered ten years since with willows, poplar, and a few spruce. They have probably afforded much of the material for the formation of the beaches which have cut off portions of the lake on the south-west coast, the sand and shingle being drifted along the shore by the long waves which every breeze from the north or a northerly direction creates. The depth of water near the coast is very small; soundings showed twenty-nine feet of water one mile north of Willow Island, the deepest part yet observed. Near Willow Island we met an Indian in a canoe with his wife and two children: he was going to Red River. I gave him some tobacco and his squaw a small quantity of tea; in return he unrolled a piece of birch bark and handed me the moufle of a moose, at the same time remarking that he was a conjuror and would "make us a fair wind." The steersman replied that a fair wind for us would be adverse to him. "Ah," said the conjuror, "but I will make one for you and two for myself."

In the afternoon I landed to examine some cliffs of clay which appear about twenty-three miles from the mouth of the river. They were sixteen feet in altitude, and exposed a clean surface of stratified marl, reposing on a brownish-black clay. The stratification was in thin horizontal layers, easily detached one from the other. The brownish-black clay showed a very tenacious character, so much so, that it was very difficult to break off with the hand masses larger than ten or twelve cubic inches, in any other direction than that of the plane of stratification. It was worn by the action of the waves into a great variety of forms, and on the beach lay large numbers of egg-shaped and spherical bodies, varying from one foot in length and three inches in diameter, to small round pellets of the size of peas. They were covered with minute pebbles, or with sand, and when broken, showed a nucleus of the tough clay which had assumed its regular form by constant rolling on the beach. No organic remains were found, and the impression conveyed by the aspect of the clay and the marl by which it was capped, satisfied me that it was of the same age as the clay and marly substratum of the Red River and Assinniboine Prairies.

The timber in the forest consisted of aspens and birch, with a few oak, elm, and ash. Our steersman, who knew the country well, informed me that good land on which large timber grew, did not extend more than one mile from the lake. It is succeeded by spruce and tamarac (*Larix Americana*) marshes, the trees being of dwarfish dimensions. The afternoon was calm and warm, so far verifying the predictions of our voyageurs, which they had based on the sudden appearance of the "weed," in the morning.

Sept. 22nd.—Last night was cold, calm, and beautiful, the thermometer fell to 36° at 10 P.M., and to the freezing point before daybreak. Donati's comet shone a fine celestial object; and notwithstanding the brightness of the moon, then nearly full, a splendid aurora was distinctly visible, and the heavens presented a peculiarly beautiful spectacle. We camped near the mouth of Drunken River, a small stream which would make an excellent boat harbour, if widened at its outlet. The clay cliffs and marl disappeared before we arrived at our camping place; the shore again consisting of a beach, with a swamp or marsh, fringed with small spruce and tamarac in the rear. I aroused the men at 4 A.M. The aurora at that hour was a splendid object, and appeared in the form of sudden flashes of low arcs of light, complete from east to west, rising in vast waves from one constant luminous base, a few degrees above the horizon. The undulations of pale light followed one another with great rapidity and regularity for many minutes together.

A strong westerly breeze early this morning, soon enabled us to reach the Sandy Bar, fourteen miles from Drunken River, and then the Grassy Narrows, a distance of seven miles. Both of these points are low, sandy, and gravelly peninsulas stretching out into the lake opposite to Big Black Island. The first exposure of limestone was seen on a small island opposite Big Black Island, which we named Guano Island. It dipped very slightly to the south-west; a search for fossils was fruitless, but on Big Black Island, and those adjacent to it, near the Little Grindstone Point, limestone of Lower Silurian age appears in the form of low mural cliffs on the west shores, which alone were seen. This limestone is a continuation of a fine exposure afterwards found on Deer Island, where we arrived at 1 P.M.

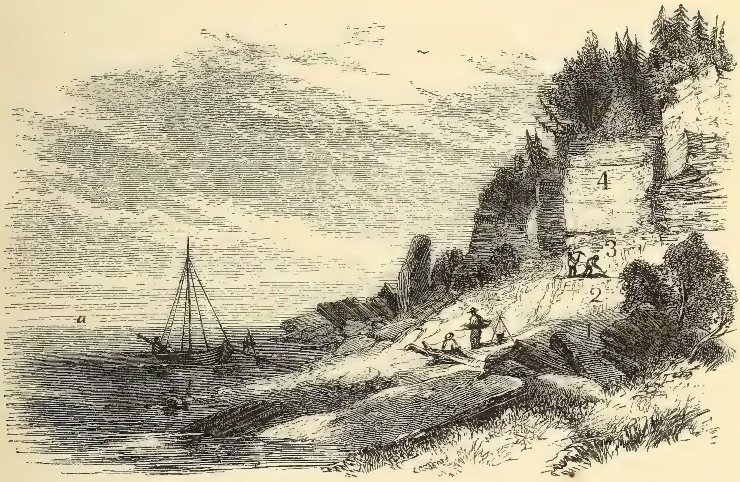
The following section occurs on Deer Island:—

Shingle Beach (Limestone):

No. 1. Four feet of dark green argillo-arenaceous shale, with thin layers of sandstone of uneven thickness—Fucoids very abundant in the sandstone. The weathered sandstone is reddish brown; fresh surfaces are white or grey. White iron pyrites assimilating the forms of disks, spheroids, and shells occurs in the sandstone.

No. 2. In many respects like the former; the sandstone layers are from one to four inches in thickness and predominate over the shaly portions. Its thickness is six feet. The character of these formations (1 and 2) is very variable; the green argillaceous portion sometimes predominates, and occasionally the sandstone.

No. 3. Ten feet of sandstone with green bands of a soft argillaceous rock, from one quarter to four inches in thickness. The sandstone often white, but generally red. A persistent green band, a few inches thick, filled with obscure forms resembling fucoids, is very characteristic. The red-coloured sandstone is often soft and friable, the white frequently embodied in the red. Both red and white contain obscure organic forms. The green patches which are found throughout the sandstone contain impressions of fucoids; an *Orthoceratite* was found in the sandstone. In some parts of the exposure on Deer Island the sandstone layers are much harder, although partaking of the characters already described. When thus hard,



Exposure on Deer Island, near Grindstone Point.

the white portion is extremely brilliant, of a pure white, and very siliceous; it would form an excellent material for the manufacture of glass. Forms, coloured brown, often pervade the white sandstone, and appear to resemble fucoids and corals replaced by brown ochreous sand.

No. 4. Eighteen feet of limestone, perfectly horizontal, very hard, and breaking off the cliff, where the soft sandstone has been weathered away, in huge rhomboidal slabs, eight to twenty-five feet in diameter, and four to ten inches thick.

The surface of the limestone shows silicified shells and corals: among the shells an *Orthoceras* nine inches in diameter was seen, with fossils belonging to the genera *Rhynchonella* and *Tetradium.* This formation is equivalent to the *Chazy* of New York and Canada, and consequently lies near the base of the Lower Silurian Series.

In the shingle immediately below the cliff, many fine *Orthoceratites* were found, with a large *Maclurea*, and *Catenipora escharoides.**

Limestone forms the west coast for some miles south of Big Grindstone Point, where we arrived in the evening. This part of Lake Winnipeg is very beautiful, resembling, in many pleasing particulars, the scenery on the justly celebrated Lake Simcoe, Canada West, near the Narrows, where wooded islands rising from the lake in clusters and rows, are suggestive of tranquil summer retreats. Between Grindstone Point and Deer Island, the lead showed sixty feet of water. It is the great fishing-ground of some of the bands of Indians who make this part of the lake their wintering place. White fish are very abundant, and caught by the Indians in large numbers; their flavour is not so fine as those of Lake Manitobah, or of the Qu'appelle Lakes. Sturgeon are also numerous, and, according to the belief of the miserable natives who fish here during the winter, the deep part of the lake is their great place of resort at that period of the year, where they lie with *Mis-ke-na*, "the chief of the fishes," in the southern portion of Lake Winnipeg.

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* For the determination of the fossils from this and other localities in the region about Lake Winnipeg, Manitobah, &c., I am indebted to E. Billings, Esq., F.G.S., Palæontologist to the Canadian Geological Survey.

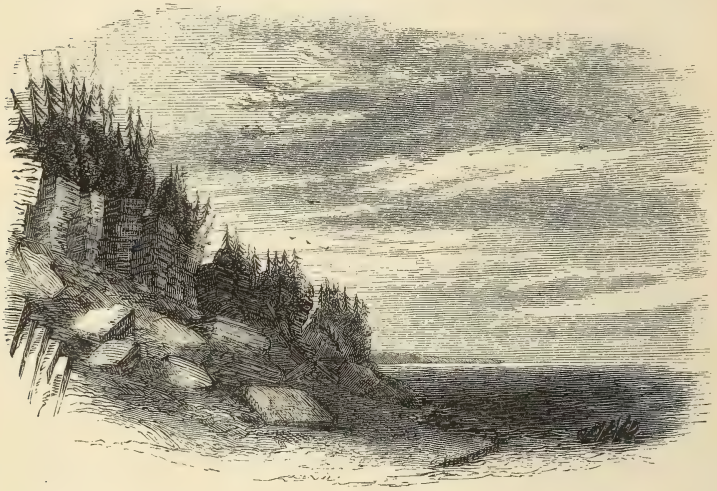
Longfellow alludes to the same superstition held by Lake Superior Indians, in the song of "Hiawatha," when he makes his hero go —

"Forth upon the Getche Gumee,
On the shining Big-Sea-Water,
With his fishing-line of cedar —
Of the twisted bark of cedar —
Forth to catch the sturgeon Nahma,
Nishe-Nahma, King of Fishes,
In his birch canoe exulting:
All alone went Hiawatha."

We approached Grindstone Point after dark, and observed a camp-fire on the beach, with a freighter's boat close in shore. It belonged to the Rev. Mr. Brooking and his family, who were returning to Rossville from Red River. Mr. Brooking is a Wesleyan missionary, for some years a resident in Rupert's Land, and engaged in the unthankful labour of attempting to Christianize the Indians. He had traveled from the head of Lake Winnipeg to Red River Settlement, to obtain medical advice for Mrs. Brooking, who was very unwell. Our interview was short, the voyageurs in Mr. Brooking's boat being anxious to take advantage of a fair wind which had just arisen. As soon as supper was ended they embarked and proceeded by moonlight on their lonely journey. He was twenty days in coming from Norway House to Red

River, having been kept back by contrary winds. His prospects of traversing the lake rapidly were now more favourable, as the south wind which prevailed would soon drive a freighter's boat to Norway House.

Sept. 23rd. — The rocks at Grindstone Point, about six miles north of Deer Island, are similar to those already described in the previous section. Being further north, the exposure is higher, and the sandstone bands more fully shown. Beneath No. 1 of Deer Island, a hard, yellow, compact sandstone appears, and is exposed for a space of four feet above the level of the water. Strata No. 1 and No. 2 of Deer Island appear in a slightly different form here: the sandstone bands are thicker; the green shaly portion more distinct as a separate band, and two feet thick; while above the hard yellow sandstone, the base of No. 1 appears in the form of a purple band



Grindstone Point.

of very soft sandstone, about one foot in thickness, containing a vast number of *stains*, which seem to have been occasioned by fucoids.

At Little Grindstone Point, the limestone No. 4 of Deer Island comes to the water's edge. The sandstone No. 3 is just below its level. Little Grindstone Point is a little more than seven miles south-west of Big Grindstone Point, and the altitude of the limestone, where it touches the sandstone at the last-named place, is about twenty-five feet, which would give an inclination of a sectional exposure in a south-westerly direction of about three feet in the mile. It appeared, however, to have a slight westerly dip, showing the true dip to be a few degrees more to the west than south-west, as was afterwards ascertained. In the limestone, turbinated shells are numerous, with *Orthoceras* of large dimensions. The scenery is attractive, and, in a geological point of view, eminently interesting. The opposite coast is formed of the unfossiliferous rocks belonging to the great Laurentian Series, which extends from Labrador to the Arctic Ocean. Within three miles of Grindstone Point, islands of this important formation occur a short distance in advance of the east coast, which is wholly composed of it.

The depth of Lake Winnipeg immediately opposite Grindstone Point is forty-eight feet. A storm afforded us another opportunity of examining the fossiliferous rocks of this locality, for no sooner had we started in the direction of the "Granite Islands," opposite the point, than the wind turned round to the north and compelled us to seek shelter in a bay of Punk Island, three miles south-east of the Grindstone Point.

On Punk Island, strata 1, 2, 3, and 4 of Deer Island were recognised in a bay, with some lithological differences. In Nos. 1 and 2 here, which could scarcely be distinguished from one another, *Modiolopis parviuscula* (N.S.) *, is very numerous.

On the north-east side of Punk Island, above the purple sandstone mentioned as occurring at Big Grindstone Point, a thin stratum of buff coloured limestone occurs, possessing some peculiarities. On raising slabs there is seen between each stratum a soft and very pure ochre of a beautiful yellow colour; it is found filling small depressions in the limestone, and in layers, from one-eighth to half an inch in thickness. The ochre, when moist and fresh, is easily worked by the fingers, quite destitute of gritty or hard particles, of an uniform pale yellow colour, and when burned, of a beautiful cinnabar red. It is used by the Indians in both states as a pigment; the limestone in which it occurs is extremely porous and often honey-combed.

Sept. 24th. — At half-past 2 A.M., the wind being fair, and the sky clear, we prepared to start. There was a sharp frost during the night, and the thermometer registered 28°. We made the traverse of Great Washow Bay, thirteen miles across, and breakfasted at a point half-way between Bull's Head and Dog's Head. The limestone cliffs here were about thirty feet high, and occupy the coast from Bull's Head to Whiteway's Post, opposite the Dog's Head. Where seen at breakfast, the coast is fringed with broken masses, which lie piled one on the other in picturesque confusion. Ascending the cliff, I found large portions detached from the main body, forming deep clefts or cracks. Some of these fissures were twelve feet wide and twenty feet deep, others three feet wide and of greater depth. Sometimes the fissures were roofed with masses which had slipped forward, forming long narrow caves lined with moss. One cave was more than sixty feet long, and, with the exception of a small aperture, closed at one end and roofed throughout. We named the spot Limestone Cave Point. From the description given by one of the voyageurs who had wintered near this place and knew the country well, the rock along the coast, from the Bull's Head to Pike Head, is fissured in the manner described. Very roomy caverns can be found, which are easily converted into excellent wintering houses for trappers. The sides of the fissures are perpendicular, and the fracture is so even as to form chambers of a rhomboidal shape. The passages between them are beautifully covered with moss, while, gracefully drooping overhead, the birch and white spruce obstruct the rays of the sun, giving to these lonely cells a gloomy and desolate aspect. The limestone is similar to that which has already been described as No. 4 of Deer Island. At the Narrows, or Dog's Head, the limestone and unfossiliferous rocks are in close proximity; the east side of the strait being composed of the Laurentian Series, on the west side, of lower Silurian limestone.

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* See Chap. on the Silurian Series.

The wind being favourable we sailed during the whole day, and at 4 P.M. reached the mouth of Jack Fish River, making a traverse across Fisher Bay, a very deep indentation whose western limit could not be seen from the canoe. In Fisher Bay islands are numerous, and some of them of large area, such as Great Moose Island, in the mouth of the bay, and Juniper Island, four miles to the north. Due west of the Dog's Head, Black Bear Island contains an excellent boat harbour, a feature worthy of note, as it occurs near the beginning of the great traverse across Fisher Bay. Jack Fish River issues from a marsh separated from the lake by a belt of sand and shingle about 100 yards broad. The river runs in a westerly direction from a series of small lakes and swamps, through a level, low country abounding in fine spruce and tamarac forests, broken by gravelly ridges supporting poplar and birch. The breadth of the river at its mouth is thirty feet, but where it passes through the swamp it is broad and deep, and so continues for some distance into the country. Jack Fish River is a favourite fishing station of a tribe of Swampys, and was once the seat of a missionary establishment.

It has been mentioned in a subsequent chapter that this tribe were deterred during the winter of 1858 from wintering here, by a threat from a noted conjuror of the Grand Rapid, illustrating the abject position in which superstition frequently places these unfortunate people.

Leaving Jack Fish River, or the Pike Head, as it is also termed, from a promontory bearing that name near to the mouth of the stream, we coasted under sail past Wicked Point across the traverse of Kinwow Bay, rounded Macbeth Point, and camped at Point Turn-again, beyond the Cat Head. The coast at the Cat Head is very precipitous ; the limestone cliffs rise about thirty-five feet from the water, without any intervening beach, so that boats cannot land, and must necessarily push on until a narrow beach is found a few miles beyond it. Limestone cliffs, similar in all respects to those of the Cave Point, occupy the coast at intervals as far as the Cat Head, and probably fringe the Mantagao-sebe Bay, as they are seen near the mouth of the Little Saskatchewan, and on the north point of the great bay which derives its name from that river. Taking advantage of a fair wind and fine night we carried on across Lynx Bay, and camped at half-past eleven, P. M.

At half-past four on the following morning a westerly wind enabled us to pass the Bushkega and Sturgeon Islands, and make the traverse across the Little Saskatchewan Bay to the mouth of the river. In making the traverse we could not see the extremity of this deep indentation in a south-easterly direction, where the Mantagao-sebe debouches. The greater portion of the bay was coasted by Mr. Fleming, during his voyage from the Grand Rapid to the mouth of Red River. The temperature of the Little Saskatchewan was found to be 52½°, of Lake Winnipeg one degree higher.

The description of the west coast of Lake Winnipeg from the mouth of the Little Saskatchewan to the Great Saskatchewan is given in Mr. Fleming's narrative, Chap. XXII., Vol. I. In order to complete a description of the entire coast line of this lake, I append the following extract from Sir John Richardson's "Journal of a Boat Voyage through Rupert's Land and the Arctic Sea."

"The eastern coast-line of Lake Winnipeg is, in general, swampy, with granite knolls rising through the soil, but not to such a height as to render the scenery hilly. The pine-forest skirts the shore at the distance of two or three miles, covering gently rising lands, and the breadth of continuous lake surface seems to be in process of diminution, in the following way. A bank of sand is first drifted up, in the line of a chain of rocks which may happen to lie across the mouth of an inlet or deep bay. Carices, balsam-poplars, and willows speedily take root therein, and the basin which lies behind, cut off from the parent lake, is gradually converted into a marsh by the luxuriant growth of aquatic plants. The sweet gale next appears on its borders, and drift-wood, much of it rotten and comminuted, is thrown up on the exterior bank, together with some roots and stems of larger trees. The first spring storm covers these with sand, and in a few weeks the vigorous vegetation of a short but active summer binds the whole together by a network of the roots of bents and willows. Quantities of drift-sand pass before the high winds into the swamp behind, and, weighing down the flags and willow-branches, prepare a fit soil for succeeding crops. During the winter of this climate, all remains fixed as the summer left it; and as the next season is far advanced before the bank thaws, little of it washes back into the water, but, on the contrary, every gale blowing from the lake brings a fresh supply of sand from the shoals which are continually forming along the shore. The floods raised by melted snows cut narrow channels through the frozen beach, by which the ponds behind are drained of their superfluous waters. As the soil gradually acquires depth, the balsam-poplars and aspens overpower the willows, which, however, continue to form a line of demarcation between the lake and the encroaching forest.

"Considerable sheets of water are also cut off on the north-west side of the lake, where the bird's-eye limestone forms the whole of the coast. Very recently this corner was deeply indented by narrow, branching bays, whose outer points were limestone cliffs. Under the action of frost, the thin horizontal beds of this stone split up, crevices are formed perpendicularly, large blocks are detached, and the cliff is rapidly overthrown, soon becoming masked by its own ruins. In a season or two the slabs break into small fragments, which are tossed up by the waves across the neck of the bay into the form of narrow ridge-like beaches, from twenty to thirty feet high. Mud and vegetable matter gradually fill up the pieces of water thus secluded; a willow swamp is formed; and when the ground is somewhat consolidated, the willows are replaced by a grove of aspens.* Near the first and second Rocky Points †, the various stages of this process may be inspected, from the rich alluvial flat covered with trees and bounded by cliffs that once overhung the water, to the pond recently cut off by a naked barrier of limestone, pebbles, and slabs, discharging its spring floods into the lake by a narrow though rapid stream. In some exposed places the pressure of the ice, or power of the waves in heavy gales, has forced the limestone fragments into the woods, and heaped them round the stems of trees, some of which are dying a lingering death; while others, that have been dead for many years, testify to their former vitality, and the mode in which they have perished, by their upright stems, crowned by the decorticated and lichen-covered branches which protrude from the stony bank. The analogy between the entombment of living trees, in their erect position, to the stems of *Sigillariæ*, which rise through different layers in the coal-measures, is obvious." ‡

The following are the approximate leading dimensions of Lake Winnipeg:

Area of Lake	8500 square miles.
Length, not including Play Green Lake	280 statute miles.
Greatest breadth	57 " "
Length of coast line	930 " "
Approximate height above the sea . .	628 feet.

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* The fact of the formation of these detached ponds, marshes, and alluvial flats, points either to a gradual elevation of the district, or to an enlargement of the outlet of the lake, producing a subsidence of its waters.

† The strata at these points contain many gigantic Orthoceratites, some of which have been described by Mr. Stokes in the Geological Transactions.

‡ If one of the spruce firs included in the limestone debris, had its top broken off, and a layer of mud were deposited over all, we should have the counterpart of a sketch of Sir Henry de la Bêche's Manual (p. 407). The thick and fleshy rhizomata of the *Calla palustris*, marked with the cicatrices of fallen leaves, and which are abundant in these waters, bear no very distant resemblance to *stigmariæ*.

This estimate of the altitude of Lake Winnipeg above the sea level, was deduced in 1857 from the levels taken across the portages along the line of the canoe communi cation between Fort William on Lake Superior, and Fort Alexander on Lake Winnipeg. The height of the dividing ridge which separates these lakes from one another, is 1485 feet above the level of the sea; and distant, by the canoe route, 104 miles from Fort William, and 510 miles from Fort Alexander.

Major Long found the sources of the St. Peter and Red Rivers to be 830 feet above the ocean, and Lake Winnipeg 630 feet above the same level—a difference of only two feet in excess of the estimate we made in 1857.

When it is considered that the St. Peter River is an affluent of the Mississippi flowing into the Gulf of Mexico, and that Red River communicates with Lake Winnipeg, which sends its surplus water to Hudson's Bay by Nelson River, the extraordinary lowness of the southern watershed becomes apparent.

Lake Winnipeg freezes every winter, ice frequently forming to the thickness of five feet, and sometimes not leaving the upper end of the lake before the 10th of June.

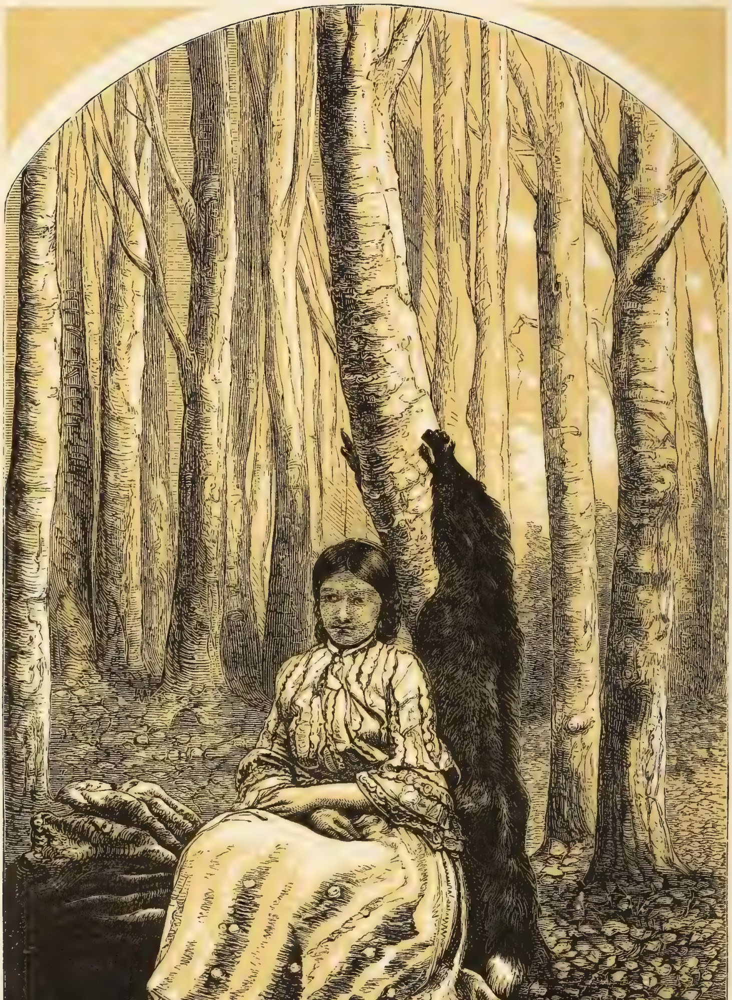
CHAP. XXIV.

THE MOUTH OF THE LITTLE SASKATCHEWAN, OR DAUPHIN RIVER, TO THE SALT SPRINGS ON WINNIPEGO-SIS LAKE.

The Little Saskatchewan.—Height of Bank.—Country in Rear.—Tracking.—Swamps.—Banks of River.—Ojibway Camp.—White-fish.—Character of Country.—Canoe Fleet.—Spruce.—Boulders.—Marsh.—St. Martin Lake.—"Money."—Pounded Fish.—War-path River.—War Roads.—Ojibway, Sioux, Swampy, Cree, Blackfoot, and Crow.—Wavys.—Fine Land.—The Narrows.—Boulder Barriers.—Sugar Island.—Indians.—Gneissoid Islands.—St. Martin Rocks.—Beach Barriers.—Depth of St. Martin Lake.—Thunder Island.—Thunder-storm.—Partridge Crop River.—Rushes.—Old Mission.—Low Country.—Indian Farmer.—Wide-spread Marsh.—Fairford.—The Character of the Country.—The Mission.—Evening Service.—Rev. Mr. Stagg.—The Farm.—Hudson's Bay Company's Post.—Rum.—Lake Manitobah.—Progress of the Season.—Rocks.—Fossils.—The Coast.—Steep Rock Point.—Devonian Rocks.—Indian Superstition.—Water-hen River.—Eagles.—Character of Water-hen River.—Pelicans.—Indians.—Wood and Prairie Indians.—Barter.—Winnipego-sis Lake.—Ermine Point.—Elms.—Salt Spring.—Snake Islands.—Duck Mountain.—Snake Island Fossils.—Arrive at Salt Springs.

A few hundred yards above the mouth of the river, horizontal Lower Silurian limestone shows itself on both sides, and it is through this rock that the Little Saskatchewan has excavated its bed. The limestone contains fossils in abundance, but in very bad state of preservation in many of the layers. They are similar to those found on Lake Winnipeg at Cave Point, and in its lithological aspect there is no appreciable difference between the exposures in either locality. The Little Saskatchewan, as its name implies, has a very rapid current, varying from one to four miles an hour. The banks are not more than twenty to twenty-five feet above its level near the mouth, and diminish in altitude in ascending the stream. They are fringed with aspen, poplar, spruce and tamarac. In the rear, swamps occur, often covered with deep moss, and containing islands of tamarac and a few balsam spruce of fair dimensions, but scarcely suitable for any other purposes than those which a limited settlement might occasion.

The river proving too rapid for using the sweeps, we were compelled to track up, a difficult and tedious labour to the men, but offering an excellent opportunity for making traverses into the country, which, however, were never deep, the swamps soon arresting progress inland. The general aspect of the river for the first four miles is very attractive, resembling in many particulars Rainy River. About three miles from the lake the limestone disappears, being covered with drift or alluvial clay. The banks rise gently with the stream, which is rapid and shallow. The yellow autumnal foliage of the aspens contrasts beautifully at this season of the year with the spruce and tamarac, and gives a charming appearance to the river banks. Towards evening we arrived at a camp of Swampys, containing four tents. They had an abundance of white-fish, and told me the river was "full of them." Anxious to test the statement I intimated a wish to purchase a score of fresh fish, and offered an Indian some tea and tobacco if he would catch them immediately. He accepted the offer, entered his canoe, and crossing over to a well-known eddy, in fifteen minutes brought back twenty white-fish, weighing on an average three pounds each. We camped close to the Swampys, on the edge of a cranberry marsh, as we knew that if we tracked a mile or so up the stream they would follow us, and our party might be increased by others in advance of



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SUSAN, A SWAMPY HALF-BREED.

them. As it was, the guns they fired upon our arrival had been heard, so that at sunset several canoes came swiftly down the stream, filled with men and women to "learn the news." The whole body camped close to us, and what with talking, shouting, screaming of children and howling of dogs, we enjoyed no rest until late in the night.

Rising at day-break on the following morning, Sept. 26th, a few hours were occupied in examining the country in the rear of the camp. The banks of the river are here about twenty feet above the present level of the river, but the country is very marshy, and clothed with tamarac and spruce behind the belt of aspens which fringe the river banks. After breakfast, the wind being fair, we hoisted sail, and in company with our Swampy friends proceeded up the river. A little fleet of twenty-three canoes, each with a birch bark sail, glided quickly ahead of us, but the breeze freshening, we soon caught and passed them one by one. About nine miles from the mouth, the banks of the river are not more than ten feet above its present level, but are rarely flooded. They consist of alluvial clay, and sustain many groves of fine spruce and aspen. At some of the bends there is a large accumulation of boulders, consisting chiefly of the unfossiliferous rocks. The colouring of the trees, at this season of the year, was unusually delicate and beautiful, nearly all the aspens in front being yellow, while those in the rear, protected in some measure from the night frosts, still retained their green.

About five miles from St. Martin Lake, a wide-spreading marsh begins, on the edge of which we camped, our Indian friends soon closing with us; when the wind failed, the squaws towed their canoes with lines made of twisted cedar bark. Some of the old men were anxious to show me some specimens of "Money" they had carefully folded in bits of cloth or birch bark. The "Money," respecting which they have no distinct idea except that it is "white," according to information they have obtained from half-breeds, consisted of fragments of selenite, iron pyrites, and silver mica. They profess to know where a large quantity of this "Money" is to be found, and demand tea and tobacco for the intelligence. These Indians had been making their autumnal fishing hunt, and possessed large birch bark vessels filled with pounded white-fish, previously dried and smoked, a miserable substitute for pemmican. They had also sturgeon bladders filled with white-fish oil. The pounded fish and the oil form part of their winter stores; some samples which were submitted to me for inspection, with a view to barter, were the reverse of inviting.

The chief pointed out a portage path between the Little Saskatchewan or Dauphin River, and the War-path River, which forms the war-road of the Ojibways and Swampys of Lake Winnipeg when they proceed on their periodical excursions against the Sioux. This war road was much used in the earlier history of the natives of the Low Country, but on account of the great diminution in their numbers, which has taken place during the present century, war is no longer a pursuit or pastime with them, as with the Lac la Pluie Ojibways and the Sioux.

The selection of certain tracts of country for the "War-path" is probably determined by the facilities presented for communication and concealment combined. The following are celebrated "war-paths," where hunting is generally disallowed, although game from that circumstance is usually most abundant.

1. "The War-path River" and war road of the Lac la Pluie Ojibways, and the Sioux, from Rainy River to

Red Lake River, thence across the prairies in the Valley of Red Lake River to Miniwaken or Devil's Lake, in Dakotah Territory.

2. "War-path River," from the south-west corner of the Lake of the Woods to Roseau River, thence to the prairies west of Red River — the same tribes.

3. "War-path River," from Lake Winnipeg to the Little Saskatchewan, thence to the prairies south of Manitobah Lake — the old war-path of the Swampy Crees, the Assinniboines and Sioux, also of the Swampy Crees and the Lake Winnipeg Ojibways.

4. The "War-road," near the Elbow of the South Branch of the Saskatchewan, on the flanks of the Grand Coteau, of the Blackfeet and Plain Crees.

5. The "War-road" of the Sioux, Blackfeet and Crows, in the valley of the Yellowstone.

September 27th. — A stormy uncomfortable night. Wavys, as the half-breeds term them, Wa-wa in Cree, (*Anser hyperboreus*), flying to the south early this morning in large flocks, were regarded as a sure sign of approaching winter. The Indians say there is some fine land with large trees in the rear of this part of the river, but from our camp to St. Martin Lake, about thirteen miles in an air-line from Lake Winnipeg, the banks are low and marshy. St. Martin Lake once reached, small eminences, which in this flat country almost deserve the name of hills, appear on the south and north coasts, before entering the Narrows. In general the shores are very low, particularly to the south-east. The Narrows are caused by a remarkable barrier of boulders, chiefly consisting of the unfossiliferous rocks, about six feet above the lake and twenty feet broad. On the west side of the barrier there is an extensive wide-spreading marsh, but the water of the lake is clear, as in most limestone regions.

We arrived at this isolated body of water, soon after noon, and camped on a beach or barrier thrown up in the form of semicircular ridges, about half a mile across the arc, and connected in the form of the letter S. In the formation of these ridges granite or gneissoid boulders are first pushed by ice upon a limestone gravel bar, aspens and willows grow on the ridges rapidly formed by sand and gravel washed up in the rear of the boulders, and the space partly enclosed or sheltered by the curve is soon filled with reeds, thus forming extensive marshes at the eastern extremity of St. Martin Lake. Near the channel which separates this maze from the main body of the Lake, a new beach is now in process of formation, and consists at present of a long semicircular line of stranded boulders, over which the sea washes in easterly and westerly gales. Round about the boulders, limestone gravel is accumulating, and thus, in this direction at least, the lake is slowly diminishing in size, the materials being in great part supplied from the wearing away of islands, and the adjoining coast.

We succeeded in passing the Narrows before breakfast on the morning of the 28th, and made our way into the main lake through a channel varying from three to nine feet in depth, kept open no doubt by the Partridge Crop River, which takes the name of the Little Saskatchewan or Dauphin River, after it has passed through St. Martin Lake. Having landed on Sugar Island, we were followed by a little fleet of eighteen canoes, whose owners appeared determined to reach Fairford before us, if possible. The chief with some ostentation informed me that the island belonged to him, but he had no objection to my exploring it. He further stated, that as chief of the band he claimed the whole country from Fisher River, on Lake Winnipeg to the mouth of Partridge Crop River

Sugar Island is a favourite camping ground of the Dauphin River Swampys, who now occupy this part of the country. We found some graves near to a garden in which potatoes were planted. A few pieces of tobacco procured us a small supply of this vegetable, so rare and valuable in these regions. Sugar Island is so named from a grove of the ash-leaved maple, the trees of which bore old marks of tapping.

Sugar Island.

I found here what appeared to be partially metamorphosed sandstone rock, tilted at an angle of 50°, with a S. 30° W. strike. At one extremity of the island it approached the character of gneiss, at the other extremity it presented the appearance of impure sandstone layers tilted at a high angle. Sugar Island is about a mile from the Narrows, and lies S. 75° E. from three small islands, which upon examination were found to consist of gneiss intersected with quartz veins. The rock on Sugar Island is exposed on one side in the form of a precipitous cliff 20 feet high. On the opposite side it slopes gradually to the water's edge.

We went out of our course to visit the gneissoid islands before referred to. The first island bore nearly due east of Sugar Island. It consists of gneiss with rose coloured felspathic veins, pursuing a general direction of S. 40° E. The axis of the island is also S. 40° E., and the gneiss is intersected by fissures nearly at right angles to one another, one set bearing S. 20°—40 E. The surface of the gneiss on the highest point, which may be 23 feet above the lake, is polished and furrowed in a direction S. 55° E. The south-east shore is precipitous, the opposite sloping.

The second island consists of a dome-shaped mass of gneiss with large quartz veins meandering through it. The third island, within a few yards of the first and second, shows far less metamorphic action, and with a strike S. 15° W., has a dip 75° from the vertical. It is precipitous to the N.W. and slopes to the S.E.

Proceeding along the south-west coast we found a barrier of beaches along the shore about 300 yards distant from it, on which boulders of the partially metamorphosed sandstone and gneiss were piled up, farther on were worn and large unworn fragments of a siliceous limestone, which, however, was nowhere found in position. The occurrence of these gneissoid islands in a flat limestone country is very interesting; the metamorphosed sandstone shows that the epoch of their elevation must have been before the deposition of the limestone found on Thunder Island, to which we next proceeded, and after the deposition of the sandstone on Sugar Island. The three gneissoid islands, having no name, we called

St. Martin Rocks. It is not improbable that the epoch of their elevation was simultaneous with outbursts which have been observed in other parts of the continent. At noon we arrived at a semicircular island of beaches similar to those at the east end of the lake. They are due to the great shallowness of St. Martin Lake, which, with an area of over three hundred square miles, was in no part of our course found to be more than eighteen feet deep, and often only five and six feet, for long distances.

In the afternoon we landed on an island where stratified limestone, in horizontal layers, was exposed. The limestone possessed some singular peculiarities. Numerous cup-shaped forms, of very large dimensions, were visible in projecting masses over the whole of the surface exposed. Many of these cups were fully thirteen inches in diameter at the surface, and would hold at least one quart of water. They consisted of concentric rings, or cups, regularly arranged, and from ten to fifty or more in number. The thickness of each cup varied from one-tenth to one-quarter of an inch. A single specimen resembled a gigantic onion which had been cut in half, with a few of the inner layers extracted, leaving a cavity or depression. Many square yards of surface were variegated with this structure. The colour of the limestone is a buff-yellow, its fracture is uneven, and masses are difficult to separate, being extremely hard and siliceous. The height of the exposure is sixteen feet, and so nearly horizontal, that no inclination could be detected. The island having no name, and being remarkable for its rock formation, it was thought worthy of some designation: we therefore called it "Thunder Island," in memory of a storm of hail and rain, accompanied by lightning and thunder of more than ordinary violence, which made us very uncomfortable for the rest of the day and during the ensuing night. It was the last of twenty thunder storms which we had encountered since entering the prairies on the 14th of June, and was only second to one in violence and sublimity.

Anxious to get on, we pulled at the sweeps until after dusk, having reached an island about four miles from Thunder Island. We found a sheltered cove, and all slept in the boat, there being no spot on the boulder-beach, or barrier, on which we could discover six feet of level ground.

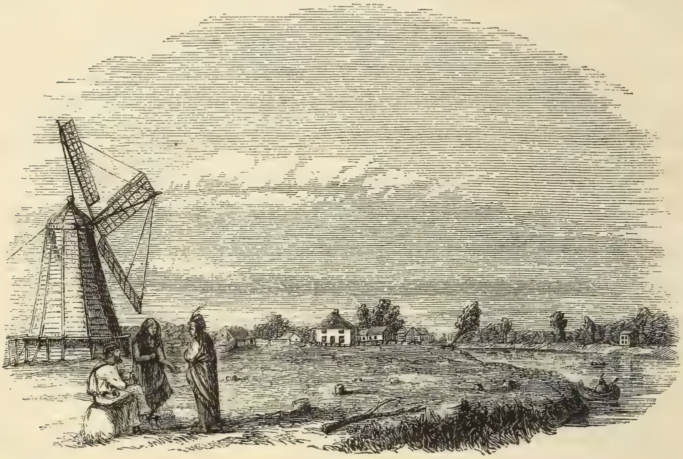
Sept. 29th.—When morning dawned, which it did in a drenching, cold rain, we found the boat attached to one of the stony barriers which protect certain aspects of the islands, or main shore. The ever-present marsh lay between us and the timber we needed for fuel; but the wind now rising to a gale, compelled us to remain satisfied with an exploration of our boulder barrier to its utmost limits. It was about one hundred yards broad, two to three miles long, and consisted of waterworn masses of limestone and gneiss, with limestone gravel between them. The marsh which separated it from the island was full of weeds, and harboured wild fowl, some of which we succeeded in killing.

The steersman found great difficulty in discovering the mouth of Partridge Crop River, or St. Martin River as it is also called. A maze of rushes extending inland, as far as the eye can see, hides it from view. Half a mile up the stream we saw the houses of the Mission, established but afterwards abandoned, by the Rev. Mr. Cowley. All the houses were in ruins, and tenantless. The whole country is very low, and liable to be flooded in the autumn and spring. There are not more than a few hundred acres of land, elevated four or five feet above the river, and fit for agricultural purposes. The spot was one, however, of great resort among the Indians of this part of the country, and hence the probable reason why a selection of this site was made for the establishment of a Mission. On landing, we found one Indian family who are determined to continue the cultivation of the little fields which have been cleared and enclosed. They had accumulated three small stacks of hay, were possessed of a yoke of oxen, and were living in one of the least dilapidated houses.

We took to our boat at the beginning of Partridge Crop River, having secured a guide from the fleet of canoes in the rear, to take us through a narrow passage between beds of rushes which cover many square miles, and constitute the "Crop," so called by the Indians on account of the resemblance which the outline of this reedy expanse bears to the "crop" of a partridge. We threaded our way through the mazes of a marsh supporting rushes so tall that, without climbing the mast of the boat, it was impossible to see beyond the masses which enclosed us. The rushes measured from ten to twelve feet in length, and grew so thickly together that they formed a compact green wall, past which the current flowed as if they were formed of solid, stable materials. Through little openings, which were now and then disclosed, we saw tranquil ponds, with a scarcely perceptible stream. Here reveled hosts of ducks of many species.

We arrived at Fairford at 3 P. M., having occupied about two hours in passing through the Crop.

Fairford is very prettily situated on the banks of Partridge Crop River (a continuation of the Little Saskatchewan), about two miles from Lake Manitobah. The banks are here about twenty feet high, and show alluvial clay with boulders, but a short distance in the rear of the river the limestone approaches the surface, and is covered with eight to ten inches of vegetable mould. Although the appearance of the country is attractive, the shallowness of the soil will not permit of extensive agricultural operations. The dip of the rock is towards the south-west, but at so small an angle as to be almost imperceptible, except when a surface of several square yards is exposed. Fossils are few in number, and obscure: the limestone breaks up into thin slabs, being very compact and hard.



Fairford, or Partridge Crop.

We attended evening prayers in an excellent school-house, which serves the purpose of a chapel. There were forty persons present, consisting of Indians and Half-breeds. The service comprised a hymn and a chapter from the New Testament, respectively sung and read in the Ojibway language, an exposition of the chapter by means of an interpreter, and a concluding prayer. The Lord's Prayer was repeated aloud in Ojibway by the whole congregation.

There are one hundred and twenty Christians, adults and children, at this Mission. The houses, fifteen in number, are neat, comfortable, and in excellent order, and several new dwellings are in process of erection. The appearance of this Mission is very promising, and in every way most creditable to the unceasing labours of the zealous missionary, the Rev. Mr. Stagg. Miss Harriet Thompson, a young lady from my native place, Nottingham, England, is residing at the Mission, and devotes herself with exemplary industry, in connection with Mrs. Stagg, to the education and care of Indian and half-breed children. It was a very unexpected and pleasant incident in these remote wilds to meet a young lady so recently from England, acquainted with my relatives and friends, and engaged in a work involving so much strength of character, self-denial, and true Christian sympathy. Miss Harriet Thompson has devoted herself to her difficult task in the right way; although only a few months at the Mission, she has made considerable progress in the language spoken by the Indians who visit Fairford, and I was much surprised and impressed when I heard her repeat aloud at evening service the Lord's prayer in the Ojibway tongue, leading a score of dusky worshipers, who, in the absence of that commiseration which made this incident possible, would in all probability have still been worshipers of Manitou, and slaves to a degrading superstition, in place of possessing a growing faith in "Our Father, which art in heaven." Miss Thompson gave me a few numbers of the "Nottingham Journal," which subsequently served to while away most pleasantly several hours round the camp fires on Dauphin Lake and the summit of the Riding Mountain. The farm at the Mission is in capital order, and although the area adapted for cultivation is not likely to induce the establishment of a large settlement, yet Fairford will become an important centre. We were supplied with potatoes, onions, turnips, fresh bread, and butter, and otherwise most hospitably entertained by Mr. and Mrs. Stagg.

The Hon. Hudson's Bay Company have a post at this mission, but it is matter of deep regret that the heathen Indians who come to barter their furs here should be permitted to have access to rum. The little fleet of canoes before spoken of, arrived during the evening, and at nightfall the sounds of drunken revelry told how terribly the debasing influence of this traffic must operate against the Christian and humanizing influence of the missionary. The post had been but recently established, and the distribution of intoxicating liquors to the Indians appeared to be a subject of deep anxiety and trouble to the Rev. Mr. Stagg.

We reached the mouth of the river at noon on the last day of September, and entered Lake Manitobah with a head wind, which soon compelled a retreat to a low sheltered beach. The exposed aspens were now quite yellow, but a tint of green still remained on groves at some distance from the lake shore. Large boulders are piled up high upon the beach, and behind them is the unfailing marsh. In shallow bays limestone gravel forms a sloping beach to the water's edge, but in the rear is a marsh. It is only at the headlands that rock in position, or firm soil, has been seen as yet.

In the afternoon we set sail, and arrived at Flat Rock Bay, where limestone of Devonian age is seen on the south side. Some of the layers are highly fossiliferous, and hold numbers of *Atrypa reticularis* and *A. aspera.* The stems of crinoids are common, but the species are very few. The rock is nearly horizontal, and the general dip south-west, at a very small angle but many slight undulations occur, giving an inclination of equal extent in an opposite direction. The exposure in the bay is ten feet high, and is worn into caves. The colour is a pale-buff with some reddish-brown layers. Fucoids are abundant, and become, when weathered, yellowish-buff. Small oaks are scattered near the spot where we camped, interspersed with aspen. In the rear tamarac and spruce swamps prevented an examination of the country for more than a few hundred yards from the shore. Where rock in position does not limit the lake, the marginal barrier of boulders is generally found with a beach, a marsh, or a swamp in the rear.

October 1*st.*—Collected fossils, breakfasted, and pulled to Steep Rock Point. Here the limestone (Devonian) is twenty feet high, quite abrupt, with six feet of water at the base of the cliff. The layers are more massive and compact than before noticed; they occur from one to three feet in thickness, are very hard, and hold many organic forms replaced by crystalline carbonate of lime. Three and a half fathoms of water were found within one hundred yards of Steep Rock Point. A number of swans were seen sailing in a little bay to the south of this landmark in Lake Manitobah, which, by the way, the Indians who hunt in this part of the country do not visit, being persuaded that "little men" live in the caves and holes into which the rock has been worn by the action of the waves. We ran on before the wind, past Cherry Islands and Point Pa-oo-nan, or the Waiting Place, until dark, and then made for the shore, soon finding a small sheltered bay in the inside of a boulder beach in process of formation, about two hundred yards from land. Temperature of the lake, 53 deg.; greatest depth of water recorded, twenty-two feet.

Unfortunately the beach consisted of water-worn pebbles strewed over a bank of sand: former experience had established the hopelessness of attempting to procure a night's rest in a bed made on the sand or on small boulders. Sleep may be obtained, but purchased at the price of weary and bruised limbs, and a painful feeling on rising that the night has been utterly thrown away. In preference to sleeping on the sand, we stretched out blankets on the bottom of the boat, and although rather crowded, having made no preparations for this alternative, we nevertheless slept soundly and enjoyed rest.

A fair wind on the 2nd started us at dawn. We steered for the mouth of the Water-hen River, leaving on our left Crane River and Bay, where salt springs exist, and then passed through a narrow channel in a reef of boulders, which stretched from east to west, as far as we could see. The wind being fair, we pressed on, notwithstanding a heavy rain, and landed, rather late in the day for breakfast, on an island near the mouth of Water-hen River, which connects Lake Manitobah with Water-hen and Winnipego-sis Lake. Here we found a pair of white-headed eagles engaged in fishing; and as we came suddenly upon them after rounding a point, one of them dropped a fine white fish he had just caught, which was immediately seized and appropriated by our men for their own breakfast.

We entered one of the many mouths of the river at 2 P.M., and pulled up a broad channel through a vast marsh, whose limits are well defined by a belt of aspens on either hand. Having reached an attractive camping-place, where the woods came down to the edge of the river, we landed with a view to make a short traverse into the country. The river is swift, very broad, and prettily varied with well-wooded islands. At our camp the trees consisted of white spruce, 1 ft. 6 in. in diameter;

poplar, aspen, birch, and tamarac. The land on the river is low, not ten feet above the water ; in the rear we found a tamarac swamp, with belts of white spruce. The channel through which our course lay was about three hundred feet broad and three feet deep, with a flat limestone bottom. The water was clear and brilliant, fish very numerous, and water-fowl abundant.

October 3rd. — *En route* at 9 A.M., — the early part of the morning being employed in drying clothes after the rain of yesterday. We commenced pulling up Water-hen River, which here appears to contain many low islands, and its aggregate breadth must be several hundred yards near our camp. Signs of the approach of cold weather began to thicken around us ; a large flock of pelicans, wheeling in circles far above, suddenly formed into an arrow-headed figure, and struck straight to the south ; and yellow leaves drifted through the air before a cold north wind, promised us, as the half-breeds said, by the beautiful aurora of last night. Islands, low and reedy, continued to appear until we arrived at the Great Bend, where a band of Indians have their winter quarters. The Indians are Roman Catholics, originally from Oxford House. I persuaded one of them to act as guide up Moss River to Dauphin Lake, after we had visited the salt works. Their tents were dirty and excessively odorous. In general, the Indians of Lake Winnipeg and Manitobah, in point of cleanliness, cannot bear comparison with the Prairie Indians.

We met here, also, a freighter's boat, in charge of a French half-breed, who, with his family, was returning from the Salt Springs to Oak Point, with about twelve bushels of salt. We exchanged a little tea and tobacco for ducks and fish ; and on the following morning started by the Middle Branch of Water-hen River for Winnipego-sis * Lake, leaving Water-hen Lake to the north. The river is very broad, shallow, and reedy; low belts of aspens, on either side, indicate the only land visible.

A fair wind drove us swiftly on, and at noon we stopped at Ermine Point, on Winnipego-sis Lake. This is a low sandy beach, with a marsh behind, and remarkable for some fine old elms, crooked and gnarled, yet flourishing near to a salt spring. At 4 we reached Snake Island, where we camped early, for the purpose of examining an exposure of rock, and to collect the fossils which a glance showed it contained in abundance. The Duck Mountain loomed a grand object in the north-west.

The rock exposures on Snake Island are very interesting, not only on account of the fossils they contain, but in consequence of the evidence they afford of a slight upheaval, so rare in the present disposition of the rocks of this region.

The exposure at its highest point does not exceed twenty feet, but it is the centre of a low, narrow anticlinal, running north and south nearly. The dip on the east side is S. 75, E. ∠ 18°; and on the west, W. 20, S. ∠ 5°. The limestone is highly fossiliferous, beautifully stratified, very hard, and bituminous. It holds abundance of *Atrypa reticularis*, *Tellina ovata;* with fossils belonging to the genera *Favosites*, *Euomphalus*, *Productus*, *Gomphoceras*, *Orthoceras*, *Lituites;* together with *Trilobites*, *Crinoids*, &c.

On the morning of the 4th of October we set sail from Snake Island, and arrived at the Salt Works and Springs at noon.

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* Winnipego-sis, or Little Winnipeg Lake.

CHAP. XXV.

FROM WINNIPEGO-SIS LAKE TO THE SUMMIT OF THE RIDING MOUNTAIN, AND THE SUMMIT OF THE RIDING MOUNTAIN TO MANITOBAH HOUSE.

Character of the Country.—The Duck Mountain.—The Salt Springs.—The Wells.—The Manufacture of Salt.—Salt Springs and Lagoons.—Moss River.—Rapids.—Character of River.—Valley or Dauphin River.—The Riding Mountain.—Lake Ridge.—Hay Ground.—Dauphin Lake.—Pike.—Snow Birds.—Journey to the Summit of the Riding Mountain.—Marshes.—Ridges.—Character of the Country.—Whisky Jack.—Quaking Bog.—Pitching Track.—Rabbits.—Foot of Mountain.—Cretaceous Rocks.—Terraces.—Conical Hills.—White Spruce.—Brown-nosed Bear.—Summit of the Riding Mountain.—Former Character of the Riding Mountain.—Denudation.—Table Land.—Snow Storm.—Source of the Rapid River.—Indian Superstition.—Descent of Riding Mountain.—Character of the Mountain.—Fish.—Sickness.—Cupping.—Ta-wâ-pit.—Great Bones.—Grasshoppers.—Journey from Dauphin Lake to Lake Manitobah.—Character of the Country.—Bogs.—Aspen Ridges.—Ridge Pitching Track.—Ebb and Flow Lake.—Indian Tent—Interior of.—Supper.—Sleep.—Buffalo Runner.—Manitobah House.

THE surface of the country where the Salt Springs are found is only a few feet above the level of Winnipego-sis Lake, and apparently nearly horizontal for many miles inland, on a north-west course. The barren area occupied by the springs and wells is about ten acres in extent, but the open country, with points of surrounding forest converging towards the springs, may include several hundred acres. The trees in the vicinity consist of spruce, aspen, willow, birch, and a few stunted oak. The wells are five feet deep, and the water in them was two feet five inches above the level of the lake on the 5th of October, as ascertained instrumentally. The wells are found upon a slight elevation, which gently inclines and blends with a vast marsh connected with Moss River, in a southerly direction. The woods fringing this marsh approach within a mile of the Springs, west and north-west.

The level country extends across the peninsula from Red Deer's Point, about three miles in breadth, to a deep indentation of Lake Winnipego-sis, about five or six miles broad; after which it continues low and marshy, with tamarac, aspen, and white spruce woods to the foot of the Duck Mountain, a distance of sixteen to eighteen miles. From Snake Island, and even from the level of Winnipego-sis Lake, a few miles from shore, the country between the foot of Duck Mountain and the Lake does not present a single eminence to break the level from which the Duck Mountain rises. It resembles, in every important physical feature, the level tract at the base of the Riding Mountain. These observations apply only to that part visible from Snake Island and the lower portion of Winnipego-sis Lake.

The soil at the Salt Springs is a very retentive yellowish-white clay, containing small limestone boulders and pebbles, with boulders of the unfossiliferous rocks. The wells for obtaining a supply of brine, are sunk wherever a small bubbling spring is observed to issue from this retentive clay. The springs are constantly changing their position, and as the wells become exhausted from time to time, a fresh excavation is made where a new spring is observed to issue. No doubt boring, or deeper wells, would prevent these changes, and not only secure a larger flow of brine, but ensure its permanency. The wells at present are twenty-five in number; but some of them appear to have been lately abandoned, and others have long since ceased to yield brine. They are situated four hundred yards from the lake shore, and were first worked forty years since, by James Monkman. This enterprising individual struggled for many years against the importation of English salt, which was sold in the settlements at a cheaper rate than he could afford to manufacture salt on Lake Winnipego-sis. He has made salt at Swan River and Duck River. The manufacture is now carried on with profit for the Hudson's Bay Company at Swan River, and at Winnipego-sis Lake by Monkman's sons.

At the "Works" there are two small log-houses and three evaporating furnaces. The kettles, of English construction, are well-made rectangular vessels of iron, five feet long, two feet broad, and one foot deep. They are laid upon two rough stone walls, about twenty inches apart, which form the furnace. At one extremity is a low chimney. The whole construction is of the rudest description, and at the close of the season the kettles are removed, turned over, and the furnace permitted to go to ruin, to be rebuilt in the following spring.

The process of making salt is as follows: When a spring is found, a well, five feet broad and five feet deep, is excavated, and near to it an evaporating furnace erected. The brine from the wells is ladled into the kettles, and the salt scooped out as it forms, and allowed to remain for a short time to drain, before it is packed in birch bark roggins for transportation to Red River, where it commands twelve shillings sterling a bushel, or one hundred weight of flour, or a corresponding quantity of fish, pemican, or buffalo meat, according to circumstances.

The brine is very strong, — thirty gallons of brine producing one bushel of salt*; and from one kettle two bushels of salt can be made in one day in dry weather. There are nine kettles at the "Works," seven being in constant use during the summer season. The Half-breeds engaged in the manufacture complained of the want of fuel—in other words, of the labour and trouble of cutting down the spruce and poplar near at hand, and the difficulty of hauling it to the furnaces,—an objection of no moment, but characteristic of some of the people, who are generally unaccustomed to long-continued manual labour.

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* See Chapter on the Devonian Series.

It will be seen that the processes employed in the manufacture of salt are of the rudest description, so that without any outlay, beyond a few days' labour, the quantity might be largely increased. I spoke to John Monkman, who now makes salt here, of pumps and solar evaporation. Of a pump he knew absolutely nothing. He had heard that such an apparatus had been contrived, but had never seen one. He readily comprehended the advantage to be derived from pumping the water into shallow troughs, dug in the retentive clay near the springs, and strengthening the brine by solar evaporation. An Indian guide, who accompanied us up the Moss River, assured me that all along the west coast of Winnipego-sis and Manitobah Lakes, there are salt lagoons and springs. The Indians we met on the Dauphin Lake made the same acknowledgment, but declined to give precise information, alleging that the manufacture of salt drove away the game, and spoiled their hunting.

The extent, character, and importance of the Salt Region in Rupert's Land will be discussed at length in another chapter.

Oct. 6th.—Left the Salt Springs, and sailed before a stiff breeze to the mouth of Moss River. We found four feet of water on the bar, and nine feet at the mouth of the river. A low exposure of limestone occurs near the entrance, and another one mile and a half up the stream. The dip is very irregular. The fossils are few in number, and obscure. In its lithological aspect, it resembles the exposure on Snake Island, seven miles distant, in a north-east direction. The rock is curved, and fractured in places, showing in an exposure 120 yards long and nine feet high, inclinations varying from 20° to 40° east, with short horizontal intervals. Some of the layers are extremely hard, others fissile, others crystalline, with crystals of calc spar between the layers and in the fractures.

Near the mouth of Moss River we came suddenly upon a camp of Swampys or Muskaigoe * Indians. Several birch bark tents were placed round a small log hut, which these Indians have constructed for their permanent winter quarters. This was the first attempt which had come under my notice of Indians constructing a log dwelling-house remote from the settlements, the H. B. Co.'s posts, or Missionary stations. They followed us until we stopped to camp, and asked for a smoke.

We arrived at the first rapids on Moss River during the afternoon. They have a fall of two feet, and consist of an accumulation of boulders resting on rock. The second rapids are formed by similar obstructions. The river is here 120 feet broad and very shallow. The bank, ten feet above the water, sustains fine aspens, with a very thick undergrowth; the soil is a clay, and evidently fertile near the river, but in the rear the country passes into muskeg or swamp. In ascending the second rapids the boat had to be lightened, and hauled up by the men walking in the middle of the stream. The temperature for such work was not conducive to comfort or health, and two of the men caught severe colds, with cramps and pain in their limbs.

Oct. 7th.—A sharp frost during the night. Ice formed on the oars in the morning. Temperature of air at 8 A.M. 30°; of the river, 42°. The thermometer, during the night, fell to 26°. All the leaves are now fallen, and the country presents a very dreary appearance. The whole of the day was spent in rowing or tracking up Moss River. The bank continues from twelve to fifteen feet high, and supports some fine aspens, one foot to fifteen inches in diameter, with a dense growth of young trees springing up in the place of a former fine aspen forest, of which the large trees are the remains. The river continues very shallow, and contains many boulders of the unfossiliferous rocks.

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* From "muskeg," a swamp; sometimes spelled "muskaig."

There is a large area of good land on the west bank, near to Dauphin Lake. This secluded sheet of water we entered at 4 P.M., and came at once in sight of the Riding Mountain in front and the Duck Mountain on our right. Both are very imposing ranges from this point of view, yet presenting similar aspects; both rising from a level country a few feet above Dauphin Lake; and, as far as the eye could judge, both maintaining the same elevation, and showing abrupt wooded escarpments towards the east. They are separated by Valley River, and it is apparent that they were united at a remote epoch, and formed part of the great table-land which stretches south-west toward the Grand Coteau de Missouri.

In the evening we passed the mouth of Valley River, or *Te-wa-te-now-seebe*, literally, "the river which divides the hills," and camped on a beautiful beach, beneath some fine oaks growing upon a ridge close to the water's edge.

On the following morning we started at daylight for a part of the coast nearest to the Riding Mountain. At a distance this magnificent range appears to be clothed with forest, and to rise from a level plain to the height of about 800 feet above the level of Dauphin Lake.

As soon as we arrived opposite to what appeared to be the highest part of the range, we landed, and despatched an Indian to explore the country, and report on the nature of the swamps through which we should have to pass in attempting to reach the summit. During his absence we set nets, and leveled across the ridge which separates the lake from an extensive fertile meadow which lies between it and the mountain. The ridge is 8·96 feet above the present level of Dauphin Lake; the meadow 5·70 feet; and so continues for a distance of one mile, with an almost imperceptible rise, until a second low ridge is reached. The meadow is covered with long, luxuriant grass; a few clumps of poplar and thickets of willow vary its uniformity. There are, no doubt, many thousand acres of excellent hay-ground on the banks of Dauphin Lake, but the breadth of the tract did not appear to exceed two miles. The oak on the ridges occurs in patches, and the trees are from twelve to fifteen inches in diameter.

Dauphin Lake is twenty-one miles long, has a greatest breadth of twelve miles, and an area of 170 square miles. Its approximate elevation above the level of the sea is 700 feet, or seventy-two feet above Lake Winnipeg. It is very shallow.

Our nets produced five splendid pike, weighing about fifteen pounds each.

At the close of the day the Indian returned. He had advanced to the first great ridge, about nine miles distant, and reported eighteen inches of water in the swamps, with ice a quarter of an inch thick.

Snow birds were seen for the first time during the afternoon. They came about our camp in large flocks, but they did not appear to have quite assumed their winter dress. The evening and part of the night were spent in making arrangements for an ascent of the Riding Mountain. We took provisions for four days, a blanket for each man, with a good supply of guns and ammunition. Three of the men were left in charge of the boat, with instructions to cure all the fish they could take, as the danger of being arrested by ice in Lake Manitobah was not improbable. That large body of water has been known to freeze as early as the 25th of October.

At sunrise on the morning of the 9th of October we set out for the ascent of the Riding Mountain. Each man had a pack weighing about thirty pounds. My share consisted of a sledge-hammer for geological purposes, which proved to be an extremely inconvenient article to carry across swamps or through bushes. Once, indeed, when crossing a quaking bog with the hammer on my shoulder, I received a severe blow on the back of the head as I broke through the covering of moss over which we were pushing our steps, when endeavouring to fall flat on the springy surface.

For the first mile and a half the country is quite level and dry, with the exception of three narrow and shallow marshes. The soil is excellent and hay abundant, but no doubt in spring this extensive flat must be very wet, and, probably, to a considerable extent under water. In its present condition the pasturage it affords is very abundant and luxuriant. We soon arrived at a low ridge which marks the limit of the good land, not averaging more than two miles from Dauphin Lake. To the ridge succeeded marshes and willow brakes. These were bounded by low gravelly ridges clothed with aspen, which were again succeeded by marshes.

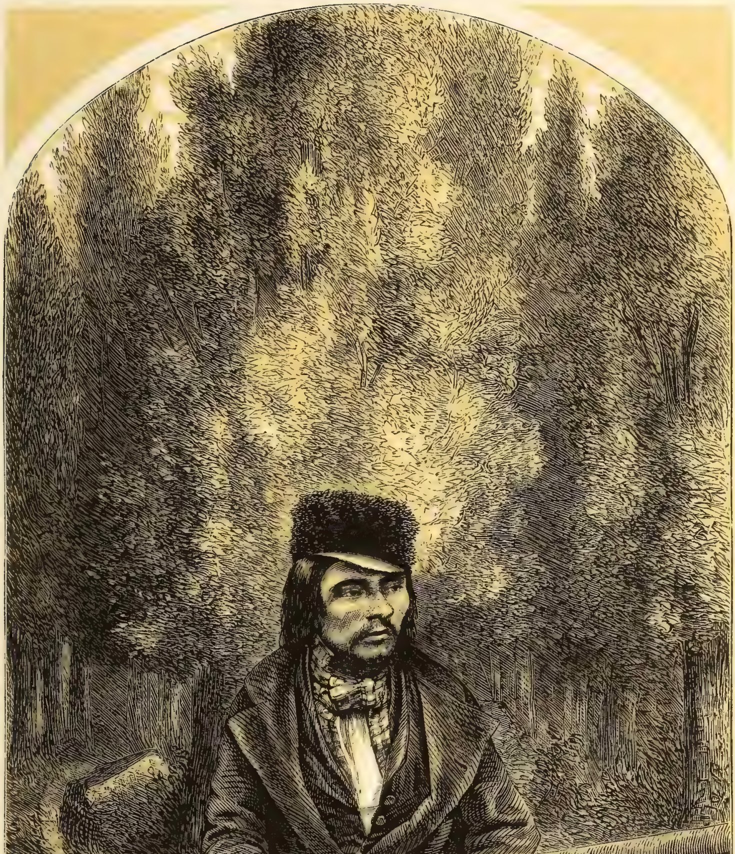
Finding it quite impossible to outflank the marshes, which appeared to stretch from river to river descending from the mountains, and to be co-extensive with the shores of the lake, we determined to push through to the highest peak, which was in reality the nearest point of the mountain to us, its greater altitude being only apparent on account of its proximity, as we afterwards ascertained. In an hour we arrived at a white spruce swamp, in which many fine trees, fully eighteen inches in diameter, were observed. Beyond the white spruce swamp we came to an old lake ridge, about fifteen feet above the general level, beautifully rounded, and composed of limestone gravel, with many boulders of the unfossiliferous rocks on the south or land side.

This ridge resembled the Big Ridge of the Assinniboine in most particulars. Our Indian guide told us that it extended for many days' journey north and south of Dauphin Lake. It forms the Indian pitching track at the foot of the Riding Mountain.

The term "pitching track" is applied to an Indian trail from one part of the country to another. West of Lake Manitobah, Dauphin Lake, and Winnipego-sis Lake, the "pitching track" follows the ridge described above. It is, in fact, the main and only dry road in this region. On the crest of the ridge there is a narrow well-worn path, which, for many generations probably, has been the highway of the Indians passing from Lake Manitobah to the Assinniboine, through the valley of *Te-wa-te-now-seebe*, or "The River that divides the hills." This pitching track is connected with "the Ridge pitching track," between Ebb and Flow Lake and Dauphin Lake.

The Whisky Jack is numerous on the ridge, and in the spruce swamp were several ravens. Formidable marshes succeed the ridge; we waded through them knee deep for a space of half a mile, and then rested a short time on a small island where stunted aspens grew. We continued to pass through marshes, aspen islands, and over low ridges clothed with willow, until a bog of such a quaking character, and of such great breadth, presented itself, that the men demanded a smoke before attempting to cross. Our Ojibway half-breed, Wigwam, insisted upon carrying the sledge hammer in addition to his pack, declaring that he was accustomed to quaking bogs, and we should have enough to do to get across without carrying anything that might impede our progress. The surface of the bog consisted of a thick elastic covering of moss, sufficiently tough to bear our weight when passing quickly over it, but if we stopped for more than half a minute the moss slowly sank and a pool of water collected around us. We marched, or rather trotted in single file, about ten yards apart. The Indian who took the lead passed nimbly over the surface, so also did the half-breeds; Mr. Fleming and I, however, two or three times broke through with one leg, but succeeded in withdrawing the unfortunate member without further damage than immersion in water and mud emitting a very unpleasant odour. Occasionally we rested on a narrow strip where the tangled roots of a few willows afforded a firm footing. The breadth of this bog was about one mile where we crossed; it was succeeded by a belt of tall reeds growing in water one foot deep; plunging and wading through this, we arrived at a gently sloping ridge about eighteen feet in altitude. On the other side of this ridge a narrow deep swamp separated us from the foot of the mountain; wading through it we ascended a hill about forty feet high, and found ourselves upon a dry terrace, on which we determined to camp, having accomplished a distance of about eleven miles. The men soon dispersed to hunt rabbits; a dozen were killed in a few minutes, skinned and placed on sticks before the fire to roast.

In passing through the swamps, we saw many fresh moose tracks,—hunters' signs which aroused the Indian and half-breeds to a high pitch of excitement, and caused



Printed by Spottiswoode and Co.] [New-street Square, London

" WIGWAM," AN OJIBWAY HALF-BREED.

them to steal swiftly on their wet and treacherous path with a speed which we found it very difficult to maintain, although they indulged no hope of coming within shot of such noble game, in consequence of an unfavourable wind, even if we had been able to preserve the necessary silence in passing through the haunts of this wary animal.

The timber on the hill at the foot of the mountain consists of aspen, with a few small oak. The soil on the plateau is of excellent quality and the underbrush very luxuriant.

The night promising to be very cold, ice forming on the kettles within a few yards of the camp, we built two large fires and slept between them, having previously dried our wet clothes as far as circumstances would permit. At 8 P. M., the sky was quite free from clouds; the comet shone with brilliant lustre, a flashing aurora gradually spread over the northern sky, the stars glittered like diamonds in the south, and the whole heavens assumed that aspect of silent beauty which renders night in the wilderness so impressive and sublime.

October 10th.—Soon after breakfast, we arrived at a steep embankment about seventy feet high, which formed the termination of a terrace about a mile broad, covered with small aspens, and threaded with moose paths. The terrace ascends very gradually and is abruptly bounded by a steep bank, from which a broken hilly tract rises towards the escarpment which forms the eastern limit of the Riding Mountain. This broken tract is covered with aspens and spruce of large size, especially in the hollows. We crossed the beds of two or three streams, which flowed through deep gullies to the plain below. Thus far, the soil consisted of drift clay with many large boulders in the beds of the rivulets; but at an altitude of about 400 feet above Dauphin Lake we arrived at a cliff-like exposure of Cretaceous rocks, through which a stream had cut a channel seventy to ninety feet deep. These rocks seemed to form the boundary of a third terrace on which were numerous conical hills consisting of gravel and boulders of the unfossiliferous rocks. The stratification appeared to be nearly horizontal, with a very slight dip to the south-west. Although a careful search was made for organic remains very few were discovered. These were identical with those found on the Little Souris, and in every particular, except the occurrence of bands holding *Inoceramus*, the rocks on the Riding Mountain resembled the exposures on the Little Souris. The layers containing ferruginous concretions were found, as well as a soft thin band from which the Indians make their pipes. The total thickness of the exposure exceeded 100 feet.

We now followed a moose path until we arrived at a high conical hill, which promised a fine view of the surrounding country. Having reached the summit, the relation of the conical hills and terraces became evident. A wide and deep valley separated us from the table-land of the Riding Mountain, about one mile distant in an air line, and perhaps 200 feet above us. Three terraces were distinctly visible below us; a range of conical hills, the result of atmospheric agencies, lay at the foot of the precipitous escarpment of the mountain, and followed its general direction. Limestone and unfossiliferous boulders were strewn on the summits and flanks of the weather-worn hills, while in the hollows between them, small lakes lay half concealed by a fine forest of white spruce and aspens.

From the brow of the hill where we stopped to dine, the Indian shot a large brown-nosed bear, which suddenly appeared on the terrace below us about seventy yards from our camp fire. His skin was in good condition, and remarkably handsome; the animal might weigh 350 lbs., although not yet fat. Leaving three men to cut up and prepare the meat, we commenced the last ascent, and arrived at the summit of the Riding Mountain at three in the afternoon. The last rise was very abrupt it consisted of a steep escarpment of drift clay with boulders, covered with a fine white-spruce, birch, and aspen forest. At the foot of the escarpment were ponds or small lakes, which fed the mountain streams we had crossed.

The view from the summit was superb, enabling the eye to take in the whole of Dauphin Lake and the intervening country, together with part of Winnipego-sis Lake. The outline of the Duck Mountain rose clear and blue in the north-east, and from our point of view the Riding and Duck Mountains appeared continuous, and preserved a uniform, bold, precipitous outline, rising abruptly from a level country lying from 800 to 1,000 feet below them. The swamps through which we had passed, were mapped in narrow strips far below; they showed by their connection with the ridges, and their parallelism to Dauphin Lake, that they had been formed by its retreating waters. The ancient beach before mentioned as extending far to the north and south, could be traced with a glass by the trees it sustained, until lost in distance; it followed the contour of the lake, whose form was again determined by the escarpment of the Riding Mountain. It required no effort of the imagination to recall the time when the whole of the flat country below us, towards the Laurentides on the east side of Lake Winnipeg, was occupied by the continuation of the Riding and Duck Mountains with their associated ranges to the north, and when the Cretaceous series, superimposed in patches by Tertiary rocks, extended to the basin of Lake

Winnipeg as it now is. The whole of this immense denuded tract of country is a splendid instance of the power of water and ice to remove many thousand cubic miles of rock.

It is very probable that before the Boulder Drift period, the chain of mountains beginning with Turtle Mountain near the forty-ninth parallel, and terminating with the Porcupine and Pasquia Ranges, including the Riding, Duck, and Thunder Mountains, were part of a high table land, composed of Cretaceous and Tertiary rocks, which extended from the Grand Coteau de Missouri to the Laurentides. The areas most affected by denudation are now occupied by Lakes Winnipeg, Manitobah, Winnipe-go-sis, and the valleys of their tributaries. The precipitous eastern escarpment of the chain of mountains show the action of oceanic agencies to which they would be directly exposed, if the country were submerged to more than 1000 feet, and from the distribution of boulders, there can be no question that a submergence to a far greater extent has taken place since the Tertiary epoch. The connection of these ranges will be best seen by an inspection of the map.*

The summit of the Riding Mountains is a vast table land declining in steps to the Assinniboine. The forest which covers the upper plateau consists of very fine white spruce, birch, poplar, and aspen ; the circumferences of some of the trees about our camp, measured five feet from the ground, were as follow : — Aspen, 4 ft. 6 in., 4 ft. 6 in., 4 ft. 1 in., 3 ft. 9 in., 5 ft. ; White Spruce, 7 ft. 3 in., 5 ft. 6 in., 6 ft. 6 in., 6 ft. ; Birch, 3 ft. 6 in., 3 ft. ; Poplar, 4 ft. 9 in., 4 ft. 6 in. These trees represent, as far as my observations permitted me to judge, the general character of the forest on the summit plateau of the Riding Mountain.

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* Vide Chapter on the surface geology of the valley of Lake Winnipeg.

Soon after our arrival at the summit, clouds began to gather in from the north-west, and towards evening a snow-storm set in which continued during the greater portion of the night. Beneath the shelter of the overhanging branches of a spruce we made an excellent camp, and having built a roaring fire, were soon engaged in discussing bear steaks as we reclined on a couch of spruce boughs, under a roof constructed of the same excellent material and impenetrable to snow.

October 11*th*.—When morning dawned we found the country covered with a mantle of snow, six inches deep. This did not prevent us from making a traverse in the direction of the lakes from which the Rapid River takes its rise. The course we had taken led us, as was afterwards ascertained, to within a few miles of the spot reached by Mr. Dickinson when he ascended the valley of Rapid River a few weeks before. This was precisely the result I was anxious to attain. An inspection of the map will show that our explorations when combined, passed through a comparatively unknown country, nearly along the 100th degree of longitude west of Greenwich, and stretching from the 52nd to the 49th parallel of latitude, thus embracing part of Winnipego-sis Lake, Moss River, Dauphin Lake, the Riding Mountain, the Little Saskatchewan or Rapid River, and the Little Souris, to the 49th parallel.

Our progress to the south was soon arrested by a lake, and the lateness of the season made it advisable not to linger too long in this region, lest we should be arrested by ice forming in the great lakes below. Anxious to kill a moose, I endeavoured to persuade the Indian to follow a fresh track, but he declared that the mountain was full of devils, and that the grizzly bear was not unfrequently met with, so that no persuasion could induce him to follow the track unless a half-breed accompanied him. The sky and air became quite free from clouds and mist before 10 A. M., permitting us to take bearings of different prominent points. After measuring a number of trees in the neighbourhood of our camp, we commenced to retrace our steps at noon. Our course was a little to the left of our track on the preceding day; and the following estimate of the ascents, descents, and distances were noted as carefully as circumstances would permit.

The first descent from the summit is about 250 feet deep, and very precipitous; where the snow had not lodged, boulders were seen reposing on unstratified clay and gravel. A narrow gully is then crossed, and an ascent of forty feet made to a terrace sloping towards the east; on this terrace are the conical hills before alluded to. The descent continues for a further depth of 150 feet in a distance of half a mile; this brought us to the edge of a ravine seventy feet deep. At the bottom flows a small stream over gravel and boulders. A rise of thirty feet led us to the top of the opposite bank, along which we traveled until we came to its termination at the beginning of a second terrace about eighty feet below us. This narrow table land is consequently about 480 feet below the summit, and on it we found the second range of conical hills. A gradual descent for a quarter of a mile lowered us thirty feet; we then ascended a bank about twenty feet high, and found ourselves on the edge of a precipitous descent, 150 feet deep, which brought us to the third terrace, and to the edge of a ravine seventy feet deep. On the sides of the ravine, and far above it, exposures of Cretaceous rocks were seen; the highest spot where the rock was observed in position, is probably between 400 and 500 feet below the summit, or about 500 above Dauphin Lake. A sudden descent of 120 feet then occurring, brought us to a fourth terrace, bounded by a steep bank, to which succeeded a narrow step, and then the low ridge where we had formed our camp on the ninth. We arrived there thoroughly wet and uncomfortable; the temperature, however, was much higher than on the mountain, and the snow of the previous night had entirely disappeared as we descended, but a drenching rain instead promised a very disagreeable night, as we could find no friendly spruce near at hand to afford protection.

October 12*th*.—The greater part of this day was spent in retracing our steps to Dauphin Lake. The walk through the marshes and bogs was found to be more fatiguing than during our ascent, on account of the rain and the cold water in the swamps. Two of the men complained of rheumatic pains, and were incapable of doing any work upon their arrival at the camp in the afternoon. During our absence the men left at Dauphin Lake had set nets, and caught some fine pike. The precipitation which had occurred on the Riding Mountain in the form of snow, was here a drizzling rain, which again commenced soon after our arrival, and continued throughout the night. On the following morning one of our best half-breeds was seriously ill; he complained of excruciating pains in the head and limbs, and experienced great relief from cupping, which the Indian performed with a flint and bowl of a tobacco pipe. At noon we started in the boat for an Indian encampment at the west end of the lake, about six miles distant. Here we found Tà-wâ-pit, an old Ojibway, with two sons, and their wives and children. Having made arrangements with Tà-wâ-pit for the hire of two horses and a guide to cross the country to Manitobah House, Mr. Fleming took charge of the boat, to return by Moss River, while I remained with one half-breed with the intention of making a land journey round the south side of Dauphin Lake to the Company's post on Lake Manitobah, which was to be our rendezvous.

October 14*th.*—Tà-wâ-pit stayed during the greater part of the night by our camp-fire, talking with the half-breed, smoking and drinking tea. He pointed out the spot near to us, where he was accustomed to take salt from the edges of a spring during the summer months. He described also at length the appearance and virtues of some gigantic bones exposed in the bank of Valley River near where it cuts through the old Lake Ridge. Tà-wâ-pit calls these bones a great medicine, and, contrary to the usual custom of the Indians, he now and then takes small fragments, bruises them to powder, and uses them as a medicinal preparation. From his description I infer that the bones are those of a mammoth; his rough drawing of the ribs and teeth in the sand corresponded, in point of dimensions, with those of that gigantic animal.

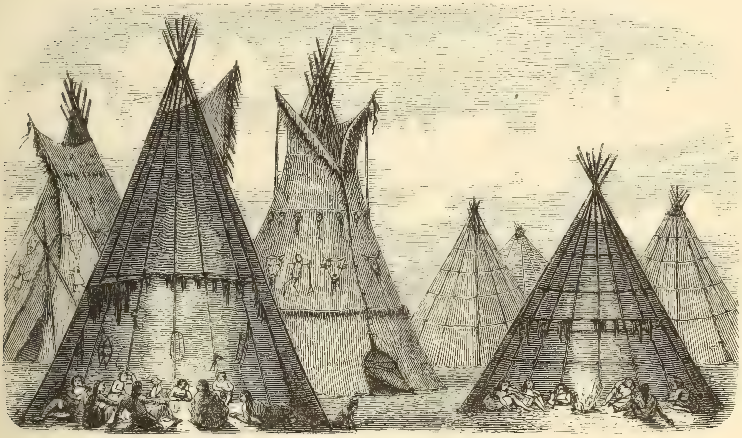
Tà-wâ-pit and family live a very retired life on the shores of Dauphin Lake. The old man is evidently of a misanthropic turn of mind; he does not associate with other Indians who hunt and live on Moss River, and the northern part of the lake. His potatoes, of which he planted a small patch in the spring, were completely destroyed by grasshoppers; affording another proof of the immense range and devastating progress of these insects in Rupert's Land, during the past two or three years. Tà-wâ-pit showed me a knife he had made out of an old file, and some pipes he was making from a soft shale, procured in the Riding Mountain some miles south-west of his tent. The shale was similar in all respects to a band I had noticed on the Little Souris, also a few days before, in the exposure described as occurring on the flank of the mountain, and from which the half-breeds had taken small blocks to make pipes. A couple of pounds of buck shot which I divided among the old man and his sons, delighted them beyond measure, and in return, Tà-wâ-pit presented me with a new pipe, and the moufle of a moose.

The hop grows in great luxuriance and abundance at the south end of Dauphin Lake; there is fine pasturage as far as the old lake ridge, but the narrow strips of marsh and quaking bog almost on a level with the dry portion show that these extensive flats are liable to be submerged in the spring. Starting at dawn, our course followed for a few miles the shore of Dauphin Lake until we came to Turtle River, which having crossed in a small canoe, we soon after took an easterly direction and entered a region of swamp, ridge, and quaking bog of very formidable character. During the whole of the afternoon our course lay through marshes and bogs, separated by low ridges covered with aspen. The horses were quite useless, and frequently stuck fast; when this occurred we were compelled to carry the bedding and provisions to the nearest ridge and help the wretched animals through the deep bogs into which they sank at every step, breaking through the elastic covering of moss which was generally of sufficient strength to support a man running lightly over it, but not tenacious enough to bear the weight of a horse. Just as night closed in we arrived at a dry gravelly ridge where there was a plentiful supply of dead aspen, from which we made a roaring fire and soon dried our wet clothes and blankets. The night was bitterly cold and the exertion of wading for many hours together through ice-cold water caused every limb to ache; the Indian guide thought nothing of it, and immediately after supper he lay down before the fire and was soon sound asleep. Two or three times in the night I rose to replenish the fire, and found the Indian without any covering but the wet skin clothes he had worn during the day, curled up on the bare ground and enjoying profound slumber.

Early on the following morning we arrived at the Ridge Pitching tract, along which we continued for a few miles, and then again descended into a region of swamps and quaking bogs. In no respect does the Ridge Pitching track between Dauphin Lake and Ebb and Flow Lake differ from the Big Ridge of the Assinniboine except in altitude. It is about one hundred yards across, evenly rounded, composed of gravel, and covered to a great extent with the bearberry. On either side are small oaks and aspens, succeeded by marshes. Its altitude above the marsh is about fifteen feet. The guide said it formed an extension of the ridge on White Mud River described in Chapter XX., and if this be the case no better means of communication by land with this part of the country could be found than the Ridge Pitching track.

Soon after leaving this excellent road we stuck fast in a quaking bog about one mile broad. The horses were mired, and it was only by dint of the greatest exertion and much cruel beating that the Indian and half-breed succeeded in getting them on to dry land. In the afternoon we arrived at Crow Creek, and the country becoming drier we were enabled to make better progress. After passing Sucker Creek, which, with the streamlet before named, flows sluggishly in a trench about ten feet deep, we arrived at a fine open prairie surrounded by tall aspen woods and covered with a splendid crop of wild hay. Here we met an Indian who was setting traps, the hunting season having already commenced. He invited us to his tent which was placed on the shores of Ebb and Flow Lake, not more than twelve or fourteen miles from Manitobah House. It turned out that the half-breed with me knew the Indian well by reputation; he is one of the most successful and industrious hunters in this part of the lake region; his tent was well supplied with Indian luxuries, such as tea, tobacco, and coarse clothing. In the small prairies near us were several fine buffalo runners, and if Indian habits and customs would permit of the accumulation of wealth, our host might soon become a rich man.

His birch-bark tent was roomy and clean. Thirteen persons including children squatted round the fire in the centre. On the floor some excellent matting was laid upon spruce boughs for the strangers; the squaws squatted on the bare ground, the father of the family on an old buffalo robe. Attached to the poles of the tent were a gun, bows and arrows, a spear, and some mink skins. Suspended on cross pieces over the fire were fishing nets and floats, clothes, and a bunch of the bearberry to mix with tobacco for the manufacture of kinni-kinnik.



Skin Tents, Cree; Birchbark Tents, Ojibway.

Soon after we entered the squaw began to prepare supper, this was done by boiling white-fish and potatoes together; when cooked the whole was poured into a large tin dish and handed to me, together with a cup of tea. Helping myself I passed the dish to the Indian, but he laid it at his feet; as soon as I had finished my supper, the Indian helped himself and the half-breed, and then passed the dish to his squaw, who divided the remainder among the other inmates of the tent. These consisted of an old watchful and restless Indian woman, the mother of the mistress of the tent; a newly married couple related to our host; the Indian guide from Dauphin Lake, and five children. After supper I spread my blanket and lay down, quite overcome with the long continued exertion of wading through swamps and quaking bogs, but too tired to sleep. The half-breed and Indians sat talking for many hours before they turned their feet to the fire, rolled themselves up in a blanket and seemingly at once " found sleep."

On the following morning I rose with a few aches and pains, which the succeeding events of the morning rapidly dispelled. After breakfast my Indian host offered me a favourite buffalo runner to ride to Manitobah House. The exertion required to manage this animal soon removed all unpleasant rheumatic symptoms. Her extraordinary sagacity is related in a subsequent chapter, but her mouth was evidently formed of sole leather and not amenable to persuasions administered through an Indian bridle. The country on the shore of Ebb and Flow Lake is low but well fitted for a limited settlement. There is an abundant supply of aspen timber interspersed with small strips and groves of oak and birch. I arrived at Manitobah House soon after noon, and was cordially received and hospitably entertained by Mr. Mackenzie the gentleman in charge.

CHAP. XXVI.

MANITOBAH HOUSE — MANITOBAH ISLAND — OAK POINT — OAK POINT TO THE SETTLEMENTS ON RED RIVER.

Mr. and Mrs. Mackenzie.—Manitobah House.—Messenger.—Missionary Privations.—Want of Supplies.—Snow Storm.—Indian Summer.—Snow Birds.—Manitobah House.—Rock.—John Campbell.—Whitefish.—Importance of.—Aspect of Country.—The Narrows.—Manitobah Island.—Dimensions of.—Oak.—Rock Formation.—Fossils.—Indian Superstitions. Fairies.—Signals.—Arrival of Boat at Manitobah Island.—Coast of Lake Manitobah.—Old Mission Station.—Unfitness of this part of the Coast of the Lake for Settlement.—Indian Liberality.—Monkman's Point.—Cause of the Formation of Marshes.—H. B. Co. Breeding Establishment.—Oak Point.—Dimensions of Lake Manitobah.—Prairie bordering the Lake.—Shoal Lake.—Character of the Country.—Big Ridge.—Little Ridge.—Arrive at the Settlements.

I REMAINED one week at Manitobah House, waiting for Mr. Fleming, who was detained by contrary winds. To Mr. and Mrs. Mackenzie I am indebted for much generous hospitality, and have great pleasure in possessing this opportunity of acknowledging their kindness and the endeavour they made to give me all the assistance and information in their power. Manitobah House is in a very dilapidated condition, but Mr. Mackenzie has erected another dwelling, which was nearly completed during my stay. A Roman Catholic Mission formerly existed here, but having been abandoned, the buildings were sold to the Hudson's Bay Company, and in the year following the transfer, they were accidentally destroyed by fire.

On Saturday, the 16th October, a messenger arrived from Fairford, on his way to Oak Point, whither he was journeying for the supplies of the Mission in charge of the Rev. Mr. Stagg.

This excellent Missionary has suffered much inconvenience from being disappointed in obtaining supplies of clothing and other indispensable articles for the children and adults, now Christian members of his Mission, and the messenger who arrived at Manitobah House was despatched at his expense to bring the necessaries which had been brought from York Factory to Red River, but not forwarded to the Mission at the usual time by the Hudson's Bay Company's brigade.

In the afternoon of this day a snow storm commenced which continued all night, and covered the ground with nine inches of snow. The thermometer was at the freezing point, but Mr. Mackenzie stated his conviction that the "Indian Summer" not having yet occurred, the snow would soon disappear and we might have fine weather for ten days or a fortnight; a prediction borne out by the rapid disappearance of the snow on the following day, and the occurrence of beautiful weather with frosty nights to near the end of October.

On Monday, the 18th, snow birds were flying about the Post in large flocks; ducks wending their way to the south, and all appearances and signs of approaching winter rapidly following one another.

Tuesday and Wednesday were occupied in writing letters and making up my journal. On Thursday, the 21st, the boat not having arrived, I proceeded to examine the surrounding country. The day was warm and fine, with much smoke from the south-west, coming no doubt from the burning prairies.

Manitobah House is very prettily situated near the Narrows of the lake. Immediately before it is a cluster of low islands on which some fine ash-leaved maple and elm grow; they are the favourite camping grounds of the Indians who hunt and fish in the country about Lake Manitobah. The land in the rear of the House is stony, but good, and there is an area of many thousand acres in extent, well adapted for a settlement. The timber consisting almost altogether of aspen on the mainland, is of fair dimensions, trees from twelve inches to fifteen inches in diameter being common. Near the Post, but on the opposite side of the lake, there is a considerable quantity of balsam-spruce and tamarac. There are no rock exposures visible near the Post, but in making an excavation for a cellar under the new house, the workmen came upon limestone rock, four feet below the surface. It was apparently horizontal, but in the fragments procured no organic remains were visible; its lithological aspect was similar to the rock on Manitobah Island, to be hereafter described. When the surface of the exposed rock was cleaned with a bucket or two of water, well preserved ice groves were visible; their direction was N. 10° W.—S. 10° E.

I visited the house of a freeman named John Campbell a few hundred yards south of the Post, and found there two comfortable log shanties, a potato field, two or three haystacks and some cattle. Campbell's son informed me that it was much easier to live here than at the Settlements. He stated as a proof of the abundance of natural pasture in the swamps that he allowed some of his cattle to remain in the woods and swamps all winter, but they became very poor towards spring. White-fish * are abundant and of excellent quality; they are the mainstay of the people attached to the Post, who cure them for winter consumption by the simple process of drying in the sun. The fishing season had already commenced

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* *Coregonus albus.*

and Campbell had caught 500 white-fish, but he wanted 4000 for his winter supply. As soon as the fish are caught in the gill nets, and brought to shore, a slit is made above the tail, through which a pointed stick is pushed. Ten fish are placed on each stick, and the sticks are staged in the open air about nine feet from the ground, beyond the reach of dogs. No curing, cleaning, or any preservative process is employed; the dry air and frost preserve them until they are needed. The importance of the white-fish in this region may be imagined when it is known that not only does it form the chief food of the Indians in the lake region for a great portion of the year, but *three white-fish* per diem constitute the sole daily allowance of the half-breeds attached to this Post; absolutely nothing more. Flour, tea, sugar, &c., are luxuries, which, if they wish to indulge in, must be purchased at high prices; nevertheless, they are healthy, happy, and according to their notions comfortable.

The white-fish I saw staged at Campbell's might average three to four pounds each. They are considered to be superior to those caught in Lake Winnipeg. This important source of food in these regions is well named At-ik-um-aig, or the Reindeer of the Waters, by the Ojibways. It forms a principal article of diet during a large portion of the year, not only of the Indians, but also of the settlers at Red River. The price the frozen fish fetch in the settlement is five for a shilling, or 100 for a pound sterling. During our winter journey to Canada, we purchased them at Red Lake, in Minnesota State, at the rate of $6 (£1 9*s.*) per hundred, to feed the dogs; each dog was allowed one white-fish, and a morsel of pemmican, as long as the pemmican lasted.

Indian summer began on the 21st. The weather was warm, "smoky," and very delightful. No boat being yet within sight, I visited the islands opposite Manitobah House, the marshes at the mouth of Ebb and Flow Lake, and the country in the rear of the Post. Its extraordinary flatness is shown by the great expanse of marsh about the islands, and along the coast north of the Hudson's Bay Company's Post. The level of the lake was three feet below high water mark, and about two feet above the lowest point to which it has been known to fall for many years.

The boat not arriving on the evening of the 22nd, I determined to take a small supply of provisions and go with Whiteway the half-breed, who had accompanied me from Dauphin Lake, as far as Manitobah Island, about twelve miles in a direction due north, and there await its arrival. This part of Lake Manitobah is not more than from three to four miles across, studded with low islands, and on the east side the coast is indented with deep bays. The strait is shallow, twenty-one feet of water close to the Narrows being the greatest depth recorded.

Manitobah Island, from which the lake derives its name, is about 600 yards long, and 200 yards broad; on its north side there is a perpendicular limestone cliff fifteen feet high; a few yards from its edge, a well defined ancient lake beach crosses the island, resembling in most particulars the Ridge Pitching track, or the Big Ridge of the Assinniboine. The part that remains in a good state of preservation is not more than 150 yards long, the breadth of the island being here about 220 yards. From this ancient beach, the land slopes gradually in a southerly direction to the present beach, with its fringe of rushes at the south extremity of the island. The timber consists of oak and birch; many of the first named tree have been cut by the people of Fairford and Manitobah House.

The native carpenter employed to build Mr. Mackenzie's new residence accompanied us to the island, and although very anxious to make the traverse across the lake after passing the Narrows, he remained for a few hours to cut a couple of oak logs which he proposed to take with him to Fairford, to mend the old freighter's boat which had formed his pay for six weeks' labour. He embraced this opportunity, on account of the difficulty of procuring oak timber near the Mission. Although oak was seen several times on the shores of Lake Manitobah, north of the Narrows, yet nowhere was it found of such serviceable thickness (fifteen inches) and length as on Manitobah Island. In the rear of the marshes which border the lake it is known to exist in small quantities.

Among the Devonian fossils procured on the island were *Atrypa reticularis*, *Atrypa aspera*, two species of *Chonetes*, a small *Productus*, an *Orthoceras*, and fragments of a large fish.

I remained on this island with Whiteway for three days; we shot a mink, a few duck, and saw a red fox, but although the island was so small, we found it impossible to kill him. Indians appeared occasionally in their canoes on the north-east coast of the lake, but although they heard our guns and fired in return, yet they would not venture near us. They have all a great aversion to caves and overhanging rocks, conceiving that such places are the abode of fairies, or Manitou. The origin of this superstition in relation to Manitobah Island is due to the sounds produced by the waves as they beat upon the beach at the foot of the cliffs near its northern extremity. During the night time, when a gentle breeze is blowing from the north, the various sounds heard on the island are quite sufficient to strike awe into the minds of the superstitious Indians. These sounds frequently resemble the ringing of distant church bells; so close, indeed, is this resemblance, that several times during the night I woke with the impression that I was listening to chimes. When the breeze subsided, and the waves played gently on the beach, a low wailing sound would be heard from our camping place, about 300 yards from the cliffs where the noise was produced. At night it was peculiarly impressive, and as we lay on the moss-covered rock, it was very easy to comprehend the objection which uneducated Indians, naturally of a fanciful and superstitious turn of mind, should have to land or remain on this "fairy" island.

On the night of Monday, the 25th October, we built as usual a large fire on the beach to serve as a beacon light to Mr. Fleming, and at nine lay down to sleep. Whiteway was telling me about the adventure of Sho-Shons, (Long-ears), whose tent was within a few miles of us, and who was tossed by a buffalo bull when hunting in the prairies during the past summer, when at 10 P. M. three shots were heard, apparently about three miles north of the island. We sprang up and replied with three shots, and proceeded at once to supply the beacon fire with dry wood. Whiteway put his ear to the water's edge, and after a short pause declared that he heard oars. After a few minutes we fired three more shots, and waited the result; in half an hour's time the boat loomed through the gloom, and before eleven o'clock Mr. Fleming and the crew were on Manitobah Island.

They had been detained by contrary winds, but were successful in killing prairie hen *, duck and plover in the upper part of the lake, near Crow Bay. At sunset Mr. Fleming had touched a low point a few miles to the north-east of our island, where Indians were encamped;

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* The Prairie Hen or Pinnated Grouse, *Tetrao cupido,* is not often found so far north as lat. 52° in the wooded country.

they told him that they had repeatedly heard shots from the Narrows, but did not care to know who had fired them in that quarter. A quiet admission that the terrors of Manitobah Island were sufficient to check the curiosity even of an Ojibway Indian.

It was past noon on the morning of the 26th when we reached Manitobah House; we remained there for an hour to partake of the hospitality of Mr. and Mrs. Mackenzie, and procure a supply of white-fish and potatoes. In the afternoon we pulled towards McKay's Point, passed between Sugar Island and Birch Island, both low and marshy areas, and camped at sunset on Pelican Island, a circular sandy beach enclosing an extensive marsh, in which duck still remained in considerable numbers. The lake near the coast is shallow, the greatest depth recorded being thirteen feet.

The whole of the coast as far as Swan Creek is very low, and bordered by beaches enclosing marshes. Here and there wooded points ten to twelve feet above the lake level separate the marshes from one another; on one of these points we observed some very fine elm, but the prevailing timber consists of aspen. A mission was established some years since at Elm Point, by the Rev. Mr. Cowley, but abandoned soon after. An attempt was made to open a cart track from this Mission to the prairies near Oak Point, but it was thought that the Indians who professed to guide Mr. Cowley through the driest part of the country, took him through the most swampy portion. The Indians now say that dry ridges exist, with intervening marshes, over and through which a cart track could be established without difficulty; but it is evident that the character of the country on this part of Lake Manitobah is not fitted for farming purposes. Isolated areas like Elm Point are doubtless to be found, but not sufficiently extensive to give to this region any value in an agricultural point of view.

We met an Indian in a canoe near Elm Point, and Whiteway, at my request, told him we were starving. I wished to ascertain the truth of the statement so often made respecting the liberality of these Indians in cases of necessity. The answer was a happy one; approaching our boat in his canoe, the Indian said, "Look, if you see anything to eat, take it." In his canoe were sixty fine white-fish and a few pike. I gave him some potatoes, tobacco, and tea, and accepted a dozen white-fish which he pressed us to take.

The shore continues low as far as Sandy Point; it is bounded by beaches fringed with fine aspen forests in the rear of marshes filled with rushes, which occupy part of every sheltered cove and bay open to the lake. We camped at Monkman's Point, where one of the family has a fishing station. They were catching their winter supply of white-fish. Monkman * pointed out a marsh in the rear of our camp, which he said was once dry ground, and afforded splendid pasturage for horses. This probably occurred during a period of low water. The marsh is separated from the lake by a gravelly beach; and a fall in the level of the lake, to the extent of two feet, would not only drain and dry this marsh, but many hundred square miles of marshy areas formed under similar circumstances and at the same period. Mr. Mackenzie, of Manitobah House, told me that former residents at that Post had seen the lake for a long period of time two feet lower than at present. In fact, before the floods of 1852 the lake was at its lowest level, and the swamps and marshes

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* The brother of John Monkman, of Oak Point, a celebrated character at Selkirk Settlement. More will be said of this individual in a future chapter.

fringing its low north-eastern coast were then dry areas covered with rank grass. In the course of a few years this will again take place, and for a long period, perhaps, settlers may enjoy fine pasture lands, destined again to revert to an intermittent condition of swamp or marsh. Monkman informed me that many years since the Hudson's Bay Company had a breeding establishment near this Point, and he remembered the time when 120 horses were pastured in the neighbourhood of Swan Creek, about twelve miles from Oak Point.

On the 28th we passed through an immense expanse of reeds called Marshy Point, threading our way through an intricate channel in which large numbers of duck still lingered. About one o'clock we arrived at Oak Point, where we found John Monkman and a number of settlers from Red River catching their winter supply of white-fish in gill nets.

Lake Manitobah is 120 miles long by 24 broad in its widest part, from headland to headland; but if estimated from Oak Point to the mouth of White Mud River, on the west side, the breadth does not fall far short of thirty miles. The area of the lake is about 1900 square miles, and its approximate altitude above the sea 670 feet, or forty-two feet above Lake Winnipeg. It is remarkably shallow, so that in the parts sounded, which were sometimes twelve to fifteen miles broad, the depth never exceeded twenty-three feet; this occurred half way between Cherry Island and Sandy Point in the upper portion of the lake. In the two traverses between Manitobah Island and Cherry Island not more than twenty-one feet was recorded, while within four miles of the coast in the southern or larger portion of the lake, eighteen feet was the greatest depth found.

The effects of winds on the large surfaces of water exposed by the great lakes of the Winnipeg Basin, is very well seen at the Narrows near Manitobah Island, the Dog's Head (Lake Winnipeg), Waterhen River, and the mouths of the Winnipeg and Red Rivers. The currents produced by the pressure of the wind changing the levels of the lakes has probably exercised an important influence in connecting different parts of the same lake basins.

At the Narrows, Lake Manitobah, a northerly wind will cause a strong current to flow through the straits into the lower or southern half of the lake; while a south wind produces a corresponding effect in the northern portion, and perceptibly increases the volume of water in the Little Saskatchewan. At the Dog's Head the current sometimes approaches the force of a rapid when the wind blows from the north; the great depth of Lake Winnipeg at this point, which, I was assured by half-breeds and Indians who fish there during the winter, exceeds one hundred and twenty feet, is doubtless the result.

At first sight it appears strange that the limestone cliffs should not have been gradually broken away, and the communication between the upper and lower portion of Lake Winnipeg enlarged. But running water exercises comparatively little effect in excavating a deep channel through a rocky barrier, or in widening a water-course; ice, beyond all question, is the main instrument in abrading, denuding, and excavating. At the Dog's Head the ice has little force on account of the proximity of islands, either when acting with a thrust or bearing away masses of rock frozen to its substance. By far the greater portion of the ice formed on this part of the coast is so protected by the islands as to melt before it can be moved by winds with its rocky burdens to distant parts of the lake.

At Manitobah House I observed the water rise fully eighteen inches before a storm. Canoes left in calm weather on a beach high and dry are not unfrequently washed away when a strong south or north wind sets in, and it often happens that, even before the approach of a change in the direction of the wind is indicated by clouds, the water of the lakes show by rising the operation of a distant pressure which has not yet manifested itself at the point of observation. The Indians and half-breeds in the fall of the year, when winds are variable, frequently notice the mouths of streams or rude registers, such as a stone set up by themselves on the beach, to see if any indications are afforded of a change in the wind, not appreciable by any other means.

In 1823 Mr. Keating, in his narrative of Major Long's Expedition to the sources of St. Peter's River, described the effects of winds on the waters of Lake Winnipeg taking place at the mouth of the Winnipeg River, as follows :—" A question which has been much discussed by travellers, is that of the supposed periodical rises in the lakes ; we do not propose to take part in the discussion at present, but we may state that we observed at Fort Alexander an appearance, such as has probably more than once been mistaken for the effect of a tide.

" On our arrival we pitched our tents upon a sort of wharf projecting into the river, and elevated about two feet above the level of the water. In the afternoon a very high wind blew from the lake and accumulated the waters in the bay, so as to cause them to overflow the wharf and oblige us to remove our tents. The next morning the waters had subsided to their former level."

The splendid prairies bordering on the southern shores of Lake Manitobah may be said to begin at Oak Point. Their boundary is an imaginary line extending south-easterly towards the Indian Settlement on Red River on the one hand, and to the old lake Ridge, where it is cut by White Mud River on the other; a distance in an air line of one hundred and ten miles. North of this line the country is in general marshy, full of reticulating lakes and low aspen-covered ridges.

The settlement at Oak Point contains about a dozen houses; their appearance does not give a stranger a favourable impression of the industry and energy of their occupants. No advantage appears to be taken of the splendid country by which they are surrounded; and with the exception of John Monkman, who at times is a marvel of energy injudiciously directed, they do not seem to have made any progress in improving their dwellings, or in enclosing a farm, since they first established themselves at Lake Manitobah. About ten miles in a south-westerly direction from Oak Point a number of French half-breeds have formed a settlement on the shores of the lake. They enjoy the advantage of having a resident Missionary (R.C.) among them.

On the 29th we made preparations for a journey on horseback to the Settlements, striking diagonally across the prairie region just described. The country in the neighbourhood of Oak Point is very attractive; its general level is about ten feet above the lake; it resembles in every respect the region about White Mud River. Our road, for a few miles, lay across a very rich and fertile tract, until an almost imperceptible ascent introduced us to a low gravelly ridge, upon which aspen woods grow in narrow strips; the forest preserves a uniform outline as far as the eye can reach, in a direction corresponding to the present form of Lake Manitobah, indicating, without glancing at the soil, the direction and extent of the subaqueous ridges, afterwards a low coast line, which were formed over the floor of Lake Manitobah at a higher level. Succeeding this low flat ridge is a broad plateau slightly undulating and studded with straggling clumps of young poplar and small oak, with willows in the shallow depressions. The soil becomes rich in vegetable mould again as we approach Shoal Lake, an extensive sheet of water, shallow, reedy, connected with numerous lakes lying to the north, and a favourite haunt of aquatic birds.

The south shore of Shoal Lake is particularly attractive. Ridges supporting heavy oak fringe the shore, and beautiful meadows, bordered with aspen and oak woods, reveal themselves in making a short traverse to the south. Although the shores of the lake are marshy, yet the oak ridges some few hundred yards south of it are high and dry. For a grazing establishment on the largest scale Shoal Lake is admirably fitted. Wild hay in any desirable quantity exists around its marshy shores, and in the beautiful prairies lying south of it timber of excellent quality for building purposes and fuel may be procured in abundance ; in the spring and autumn the lake is covered with wild fowl of every variety. Shoal Lake is a favourite sporting ground of the gentlemen of Fort Garry and the half-breeds of the settlement. It is on the main road to Lake Manitobah, and is probably destined to become a place of some note as a grazing station in the course of time.

On the 30th October I set out with Whiteway in advance of the carts, in the hope of being able to reach the settlements before nightfall. We passed through an excellent prairie country studded with aspen groves, and occasionally relieved by a broad shallow ridge, probably of subaqueous origin, like those already described. The Big Ridge of the Assinniboine is not well defined where we descended it, about eight miles west of Stony Mountain. It appears to be divided into two portions, part expanding into an undulating tract of country a few hundred yards broad, the other preserving the outline and character of the Big Ridge, but named in consequence of its diminished altitude the Little Ridge. The level country at the base of either is everywhere beautiful, fertile, and admirably adapted for settlement. We descended the Little Ridge, a step of the Big Ridge, at about four in the afternoon, and in the distance could see the twin steeples of St. Boniface with their tinned roofs glancing brilliantly in the south-east about fifteen miles off. We then passed through the magnificent prairies lying between Stony Mountain and Red River, reaching the edge of the Big Swamp just before sunset, and arrived at our temporary quarters in the settlement half an hour after dark.

The country between Oak Point and Stony Mountain is not much inferior in point of fertility and fitness for settlement to the prairies of Red River and the Assinniboine bounded by the Big Ridge. In many parts no difference in the rank luxuriance of the grass on these prairies and those south of the Big Ridge could be distinguished, but the area of light or gravelly soil covered with short stunted grass is far greater, and thus diminishes the available extent of soil adapted for agriculture. It is doubtful whether this drawback is not counterbalanced by the proximity of the country north of the Big Ridge to the forest-covered tract between the great lakes, and to the haunts of vast numbers of wild fowl which breed on the borders of the small sheets of water so numerous in this region. This tract, south of the probable limit of the forest, may be regarded as well adapted for agriculture, the groves and strips of aspen and oak on the dry gravelly areas only serving to break a vast level expanse into a series of very attractive plains, apparently bounded by forests, which are found as the traveller penetrates them to be but narrow belts separating one beautiful prairie from another.

CHAP. XXVII.

WINTER JOURNEY WITH DOGS FROM FORT GARRY TO CROW WING.

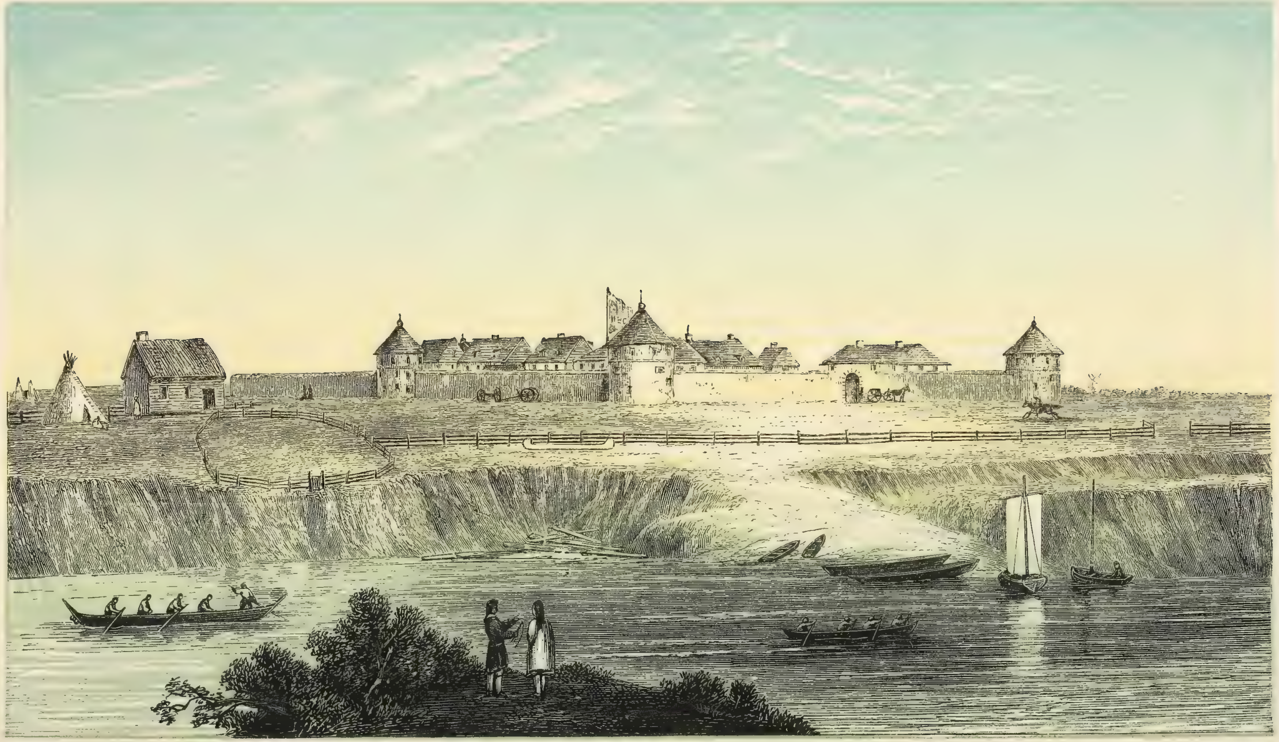
Arrival of Lord Richard Grosvenor, Lord Frederick Cavendish, Mr. Henry Danby Seymour, M.P., and the Hon. Evelyn Ashley, at Fort Garry.—Buffalo Hunting.—Lord Grosvenor's Expedition to Fort Ellice.—Preparations for a Winter's Journey.—John Monkman.—Cline.—Daily Allowance of Dogs.—A Winter Road.—A Cariole.—A Sledge.—The Driver.—Making the Road.—Prospects of a Race to Crow Wing.—The Start.—Fort Pembina.—Mr. Mackenzie.—The Woods and Prairies in the Winter Season.—Temperature at Pembina.—A Camp in the Snow.—Preparations for the Night.—Mocassins.—The Morning Start.—Making a Cache in Pine River.—Dogs watching the Operation.—They return at Night to break open the Cache.—Terrible Fate of Mr. Mackenzie in Dec., 1859, frozen to Death in attempting to reach Pembina from Pine Creek.—Running across a Prairie with the Thermometer at 20° below Zero.—Appearance of the Party after the "Run."—Appearance of a Camp during the Night.—Watchfulness of the Dogs.—Catching and harnessing them in the Morning.—Treatment of Dogs by the Half-breeds.—Overturning a Cariole.—Traveling in a Snow Storm.—Preparing to Camp in a Snow Storm.—Dogs "lying close" after a Fall of Snow during the Night.—Sagacity of these Animals.—Red Lake.—News of Monkman's Party behind us.—The Roman Catholic Missionary frozen to Death two Days previous to our Arrival at Red Lake Mission.—Indians reading the History of the Missionary's Journey from his Tracks on the Ice.—Indians relating the History of his Journey.—Savage Mimicry.—The Rev. Laurenz Lautiger, the Roman Catholic Missionary.—The Height of Land.—Cass Lake.—Arrival of Monkman's Party at Midnight.—Leech Lake.—A Dance.—The last Night in the Woods.—The last Day's Run.—Pine Woods.—Morning.—A twenty-mile Gallop.—Crow Wing.

Upon our arrival at Selkirk Settlement subsequently to the exploration of Lakes Winnipeg and Manitobah, we heard that a party of English noblemen and gentlemen had reached Fort Garry, and were then preparing for a short trip into the prairies in search of buffalo. The aristocratic hunters consisted of Lord Richard Grosvenor, Lord Frederick Cavendish, Henry Danby Seymour, Esq., M.P., and the Honourable Evelyn Ashley. They were successful in meeting with and killing buffalo a short distance south of the boundary line, in the direction of Devil's Lake, and returned from their expedition in the middle of November.

The hardships and privations inseparable from prairie adventure at this late season of the year, with the thermometer sometimes as low as zero, were not sufficient to deter Lord Grosvenor from undertaking a much longer expedition to the west, after his return from hunting buffalo. He started on the 22nd November in company with James Mackay, one of the most distinguished and enterprising natives of Selkirk Settlement, for Fort Ellice, proposing subsequently to visit the Plain Crees on the Qu'appelle.

This adventurous journey on horseback at so late a period of the year, considering the slender outfit of clothing and provisions which Lord Grosvenor took with him, showed no ordinary courage and confidence in the possession of great physical endurance. A journey in dog carioles over the snow is comfort itself compared with riding in the face of a cutting wind when the thermometer is not far removed from zero.

Lord Cavendish, Mr. Seymour, and Mr. Ashley engaged John Monkman of Oak Point, Lake Manitobah, to organize their dog trains and make arrangements for their journey to Crow Wing on the Mississippi, proposing to return to civilized life as soon as sufficient snow fell to make the country passable for dog trains. John Monkman is the most noted runner in Selkirk Settlement; with his magnificent train of dogs, possibly the best in



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FORT GARRY.

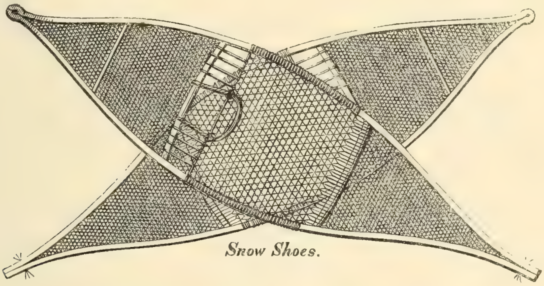
Rupert's Land, he has accomplished the journey between Pembina and Fort Garry, a distance of sixty-eight miles, in seven hours and a half. The men Monkman engaged, six in number, were generally excellent runners, and provided with good dogs.

The preparations for the winter journey of both parties to St. Paul were rather of a formidable character even at Red River, requiring not less than sixteen carioles and sledges drawn by fifty dogs in all.

It being necessary that I should take with me a number of geological specimens, field apparatus, books, &c. &c., my party required nine carioles and sledges, and a corresponding number of men; each sledge or cariole on a long winter's journey requiring one man to manage it, although the same individual, with well-trained dogs, is competent to conduct two sledges on good roads and for short journeys, when time is not an object and food easily accessible.

I engaged a half-breed of the name of Cline, an excellent runner and a very willing attendant, to organize my trains.

The distance between Fort Garry and Crow Wing is about 400 miles by the winter road, and the only places where supplies can be obtained are at Pembina, Red Lake, and Cass Lake. The chief objection to travel with a large number of dogs is the difficulty of supplying them with food, nor can the several stations be always relied on to furnish the requisite quantity for an unexpected intrusion of many of these hungry animals. Each dog requires daily about two pounds of pemmican or three pounds of white-fish, so that the provisions for a train of carioles employing thirty dogs would involve the carriage of 600 lbs. of pemmican or 900 lbs. of white-fish for a ten days' journey. A train of three dogs will draw 300 lbs. forty miles a day for ten or twelve days in succession if well fed, and the road is tolerably good, over a level country. A winter road, it may be here remarked, is nothing more than a cariole or sledge track caused by the passage of this primitive kind of vehicle over the snow, and is liable to be obliterated by every fresh fall. A cariole is constructed of a very thin board, ten feet long and twelve or fourteen inches broad, turned up at one end in the form of half a circle, like the bow of an Ojibway canoe. To this board a high cradle, like the body of a small carriage, is attached, about eighteen inches from the end of the board or floor. The framework is covered with buffalo skin parchment, and painted or decorated according to taste. The inside is lined with a blanket or buffalo robe, and when the traveller is seated in his cariole, with outstretched legs, he is only separated from the snow by the thin plank which forms the floor. A sledge is nothing more than a thin board ten or twelve feet long, twelve inches broad, and turned up at one end. The baggage is attached to it by means of buffalo thongs, and two or three dogs are harnessed to this simple vehicle with the same materials. The dogs attached to a cariole are generally decorated with collars, from which beadwork and tassels are suspended together with a string of small bells. When a train is in motion the driver runs behind the cariole or sledge, guiding it by means of a loop fastened to each corner of the floor; when tired or anxious to ride he sits on the small box containing the traveler's baggage, which is fastened to the projecting floor in rear of the cariole, or else he stands on it if no box is attached. A winter road is uniformly of the breadth of the floor of the cariole, rarely exceeding fifteen inches, and of a depth proportioned to the quantity of snow which has fallen. In making a new road where the snow is deep, a half-breed walks on snow shoes some distance in front of the dogs, which follow his track with the utmost precision through all its windings; after four or five trains have passed, the road is generally considered to be sufficiently hard pressed to admit of the easy passage of the succeeding trains; hence, a great point is gained in dog traveling if a new road has recently been made by a party in advance. To make the road is regarded, indeed, as the chief difficulty in journeying with dogs.



Snow Shoes.

From the hour it was known in Selkirk Settlement that the two parties would probably start nearly at the same time, and great feeling existing among the half-breeds respecting their endurance and the ease and speed with which their dogs could accomplish a long journey, a warm spirit of emulation arose between the men attached to each party, which rapidly communicated itself to their wives and friends. Cline told me he had heard confidentially that Monkman's plan was to give us the start for two days, and then, taking advantage of the road we should make through the untrodden wilderness, pass us triumphantly a day or two before we arrived at Crow Wing. It gradually became evident that the idea of a race from Fort Garry to Crow Wing communicated itself to the gentlemen of both parties, and indeed stimulated more or less all who were to make the journey. Cline and his men appeared extremely anxious that they should not be far behind their competitors, and even indulged the hope that if we got a fair start we might not be overtaken. When the subject of a race was first mooted to me by Cline, I regarded our chances as almost hopeless, considering the baggage with which we were encumbered. Afterwards it occurred to me that one chance lay in the greater ease with which my party, long inured to exposure and fatigue, would be able to sustain prolonged physical exertion; an hallucination, however, which subsequent experience of the physical capabilities of Lord Cavendish, Mr. Seymour, and Mr. Ashley, during their stay at Red River, served to dispel.

Dog Carioles.

All my trains being ready, we started on Tuesday, November 30th, at an early hour from Fort Garry, and took the east bank of Red River through the French settlements. Monkman's party expected to follow in the afternoon or early on the following morning. On Wednesday we reached Fort Pembina, and stayed the night with Mr. Mackenzie, the officer in charge of the Post, whose sad fate last December (described further on) is a melancholy proof of the danger attending traveling alone during the winters of this climate. The woods and prairies are then perfect deserts, Indians being at their winter quarters, birds far in the sunny south, and wild animals hybernating, or seeking food and shelter in the thickest parts of the swamps and forests. So complete is this desolation in the interior of many parts of Rupert's Land during the winter, that Mr. Christie, chief factor of the Hudson's Bay Company, when traveling from Athabasca to Red River in December 1859, did not meet with a single Indian throughout a long and dreary journey of 1400 miles.*

The thermometer at Pembina Fort indicated 22° below zero on the morning of December 2nd, when we left the Post. Having procured another train of two dogs at the small village of Pembina, two miles from the Hudson's Bay Post of that name, we struck across the prairie to the "first of the Two Creeks," where we camped. A camp is always made in "woods," if possible, for the sake of fuel and shelter. The first operation is to sweep the snow from the ground, and prepare a place for the fire and blankets. This is easily accomplished with snow shoes; and as soon as an area proportioned to the size of the party is exposed, a fire is made sufficiently long to admit of each man lying for the night with his feet towards it. No tent or covering of any description beyond a blanket stretched on poles is admissible, as it would scarcely be possible to fold canvass in the morning, and time does not generally allow of the erection of a hut, nor are the materials always at hand. When pine or spruce is accessible, a very comfortable floor can be made from the boughs, but in the prairie country or on its borders these useful trees are rarely to be seen.

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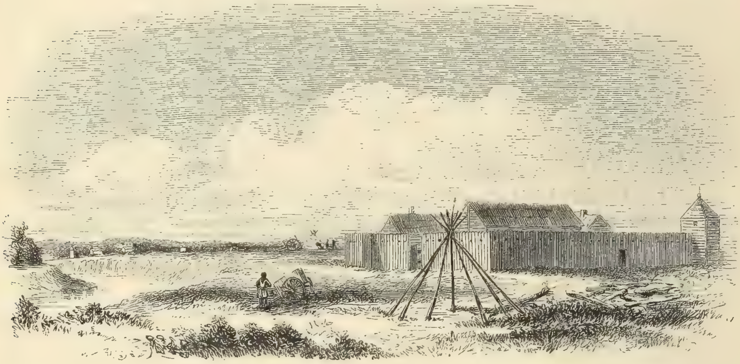
* *Nor'-Wester*, Fort Garry, Feb. 1860.

As soon as the fire is made and supper in course of preparation, the dogs are fed. After eating their allowance for the twenty-four hours, the dogs seek for warm spots for themselves as near the fire as possible, or if the night be very cold, and any wind stirring, they partially bury themselves in the snow. As soon as supper is discussed, which with the half-breeds almost uniformly consisted of cold pemmican and tea, mocassins are taken off, dried if damp, and put on again; the fire is replenished, and one by one each man or two together cover themselves completely with their blankets or robes, and go to sleep. Mocassins are necessary in making a winter jour-



Pembina.

ney, leather boots or shoes would be too cold and probably become hard, neither do they admit of that freedom of circulation which makes a soft and pliable mocassin of dressed buffalo or moose skin so warm and comfortable. The feet rarely get wet in traveling in these regions; the intense cold preserves the snow perfectly dry, and it is only near a fire that moisture penetrates a mocassin during cold weather. During a thaw, a mocassin is wet through immediately, and the discomfort must be endured from camp to camp, but colds are unknown from this cause if exercise be persevered in. Under the mocassin, the half-breeds wear a square piece of flannel or blanket wrapped round the feet, to serve as a stocking. The gentlemen wore one pair of worsted stockings, a half boot of duffel, and buffalo skin mocassins, and no one complained of cold feet at any time.

The first thing on waking in the morning is to make up the fire and prepare for breakfast. We generally rose at five, and were ready to start by daylight; breakfast, repacking the bedding, catching and harnessing the dogs usually occupying two hours and a half.

On the following day we arrived at Pine River, where Cline made a cache of pemmican in the river, some distance from our track, to be taken up on his return. A hole was cut through the ice, then about fifteen inches thick, and a buffalo hide thong having been tied round the bag, and fastened to a stick, it was let down into the water, just below the ice, the stick being stretched across the orifice. Lumps of ice were then piled on the bag of pemmican, and water poured on them. The temperature of the air being at the time considerably below zero, the water froze the instant it touched the ice, and bound the masses together in one block. Fresh ice being added, and water poured on it, the hole soon became filled with a solid mass; the operation was continued until a mound one foot above the frozen surface of the river was accumulated over the cache. As I was returning with Cline to the place where we had left the carioles and dogs, we observed two of these sagacious animals who had been unharnessed by mistake, the driver supposing we were going to camp, quietly watching our proceedings from the bank of the river. Cline, with an exclamation of anger and surprise, remarked, "Now, if we don't take care those *sacrés chiens* will try to get at the pemmican to-night, and the rascals will tell the others; I know them of old, they served me that trick before; we'll tie them to night." The conscious dogs, with tails depressed, started at a gallop back to the carioles, when they saw Cline's threatening mien.

In order to avoid the breaking open of the cache by the dogs, which might be the source of great inconvenience, and perhaps suffering to the men on their return, we pushed on for several miles before we camped. Cline counted the dogs after supper, but neglected to tie the spies, having found that none had strayed, he thought they might be trusted, and, wrapping himself in his blanket, he soon went to sleep. Rising long before daylight, according to our custom, several dogs were soon ascertained to be missing, and not being found after a rapid search in the neighbourhood, Cline instructed two of the men to make a circle round the camp, and examine all tracks by torch-light. In a very short time one of them came back, stating that fresh dog tracks pointed in the direction of Pine River, where we had cached the pemmican. Three or four men instantly started back and found the missing dogs busily engaged in scratching at the cache. It was so thoroughly frozen and compactly made, that they had produced little impression on the small mound of ice, but no doubt time and perseverance would have enabled them to reach the supplies beneath.

Pine River crossing is the spot from which Mr. Mackenzie, who had so hospitably treated us at Fort Pembina, started on the morning of the 29th December 1859, on his ill-fated journey in search of assistance. He and some companions were escorting an engineer from George Town to Fort Garry, who was traveling thither to make alterations and repairs in the steamer Anson Northrup, then laid up for the winter near the Indian settlement. The party fell short of provisions, and Mr. Mackenzie pushed on in the hope of being able to send supplies from Pembina. After leaving his companions, he appears to have followed the trail for some distance, and at the approach of night to have lost his way. His beaten track showed that in order to keep himself from freezing, he had spent the night in running round in a circle. At the break of day he started again across the trackless waste, but in a direction considerably to the eastward of his proper course. A second day of fruitless wandering was followed by a night more dreary than the first. The third day's journey brought him near to Roseau Lake, far to the east of his destination; here his strength appears to have failed him, for having hung some shreds of his coat on a tree, to mark his last resting-place, he lay down beneath it, where his frozen body was found, with one hand on his heart and the other grasping a compass.*

On the day succeeding our camp near Pine River, we crossed a very bleak and desolate prairie about eight miles broad. Fortunately the wind was blowing at our backs, otherwise it would have been insupportable, the temperature of the air having fallen to 20° below zero. As it was almost impossible to endure the inaction involved by being tightly packed in a small cariole, notwithstanding a liberal supply of blankets and robes, we preferred to run after the dogs across that inhospitable prairie which, however beautiful it may be in summer, is an exposed and desolate wild in December. Mutual astonishment was expressed at the appearance presented by each individual after this long run. Our eyebrows, beards, moustaches, hair, and eyelashes were uniformly frosted; the moisture from the breath had formed icicles down our beards, which were firmly frozen to the hoods of our blanket coats; patches of frost-bites on our cheeks, nose, or ears demanded instant friction with snow; and the outside of the coat of each man, from the nape of the neck to the loins, was covered with a narrow sheet of hoar-frost, formed by the solidification of the insensible perspiration the moment it reached the outer air.

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* An account of this melancholy journey is given in the *Red River Nor'-Wester*, for January 14, 1860.

The appearance of a winter camp during the night, when men and dogs are buried in profound slumber, is very wild and savage. Throwing a few dry sticks into the fire to light up the scene, the silent, slumbering forms of the travelers are seen stretched in two parallel rows with their feet to the fire; between the men one, two, and sometimes three huge dogs have crept; some are lying on the legs of the half-breeds for the sake of warmth, others have found a snug berth close to the fire but in imminent danger of burning their fur, a few lie coiled outside of the circle half buried in the snow. The cold is so intense that their faces are white with frozen breath, and scarcely distinguishable. The fire, even when in full glow, has not power to melt the snow more than a few inches from it, without it is exposed to direct and prolonged radiation. Now and then a watchful dog raises his head, probably disturbed by some slight movement of the sleepers; he looks once round and buries his face again. Sometimes a dog will utter a low warning growl, when three or four other dogs, probably old stagers, will rouse themselves for an instant, listen and growl, generally all looking in one direction and snuffing the air. A half-breed sits up, looks at the dogs, observes their mien and actions, and after a moment's pause, uttering the word "wolves," he quickly coils himself under his blanket again.

The most disagreeable part of the daily routine of a long winter's journey is the catching and harnessing of the dogs. Some of these animals at the beginning of winter, when fresh at their work for the season, are exceedingly restive under coercion of any description, and not unfrequently snap at their masters, who invariably arm themselves with very strong mittens of buffalo or deer hide when harnessing a savage and powerful animal. They require long-continued and most severe punishment to make them obedient to the word of command. The treatment to which many of the poor beasts are subjected would give them a fair claim to the protection of a law against cruelty to animals. The faces of some of our dogs were dreadfully disfigured by the blows which their unfeeling and thoughtless masters inflicted on them. An Esquimaux whip is the instrument which every driver should be compelled to use, but the half-breeds trust to sticks and stones, or any object within reach on the road, which is picked up as they pass and thrown at the dogs. It is painful to witness the sudden start of terror with which each animal, looking over his shoulder as he trots along, watches the mien and motions of the driver as he poises the stick, which he knows how to throw with certain dexterity at the terrified animals. All the dogs give a simultaneous jump on one side as the missile flies past them, when directed at the leader of the train; and not unfrequently would the cariole be overturned if it were not for the strength and skill of the driver in holding the loop with which he steers it. When this occurrence takes place and the dogs are at full speed, the only plan left for the helpless traveller is to draw his arms close to his sides, and wait until the cariole is righted by the driver; but any attempt to right the cariole by putting out an arm is a dangerous operation, which might occasion a broken limb. In descending steep hills, it is always advisable to walk or run, which all would prefer for the sake of exercise, except when the road is very good, and the trains can proceed for many miles at a gallop without fatigue.

A heavy snow storm is a serious matter in the prairie. It is then absolutely necessary for all the trains to keep close together; the drifting snow soon obliterates the road; and, although the dogs, by means of their sensitive noses, will follow the tracks of the leading cariole even when completely hidden from view by a light fall, yet when drifts accumulate they are at fault.

Preparing to camp in a snow storm is not an agreeable operation, or suggestive of that comfort and safety which a camp almost always presents. When the fire is well lighted, supper cooked and eaten, and the party "turned in," then it does not matter much how heavily it snows, the trouble being reserved for the following day. After a heavy fall during the night, men, dogs, carioles and sledges are all covered with a thick mantle of pure white; a sudden shout from the guide enlivens many of the apparently lifeless forms, recognized only by their outline; but some of the sagacious dogs take advantage of the concealment afforded by the snow, and, quite neglectful of the whistles and shouts of their masters, "lie close." We were detained for more than three hours on one occasion after a heavy snow storm, by some of the dogs preserving perfect silence and a motionless position under their covering of snow, within thirty yards of our camp fire. They were found by dint of walking systematically round the camp fire in a continually enlarging circle, the half-breeds being quite aware of the advantage which these cunning animals would take of their accidental concealment. A loud shout every now and then announced that a searcher had stumbled over a truant, whose depressed mien and conscious look showed how well he knew that he had been the cause of anxiety and trouble.

On the 8th of December we arrived at Red Lake, and had a splendid gallop of twelve miles across the ice from the mouth of Red Lake River to the Ojibway village and Missionary station. An Indian from Pembina caught us just as we were about to commence the traverse, and brought the information that Monkman's party had left Fort Garry on the day following our departure, and were steadily pursuing the road we had made. The Indian thought they would catch us in a day or two. Soon after our arrival at the Red Lake Mission we learned that the Roman Catholic Missionary had been frozen to death two days previously, in an attempt to cross the ice during a snow storm, from a promontory about two miles away from the Mission. He had been visiting a camp of Ojibways, who warned him of the perils of a return across the ice during the storm, and invited him to pass the night in their wigwams; but the missionary thought that he would not incur any danger of freezing during so short a traverse, although the thermometer indicated a temperature of 25° below zero, at the opposite station.

He was frozen within two hundred yards of the Mission House, near to which were a number of log houses, tenanted at the time by half-breeds and Indians, When the body was found on the following morning, a number of Indians set themselves to trace his steps from the Ojibway camp across the ice, a difficult undertaking, in consequence of the high wind which was blowing at the time having, to an inexperienced eye obliterated all traces of his steps. With astonishing accuracy these wild men read the brief history of his journey, and related the incidents to me as we stood on the banks of Red Lake, with the Ojibway village and the course of the unfortunate missionary in view. "There," said my dusky informant, pointing to the ice not more than half a mile from the houses, "there he first turned his back to the wind, and there he knelt to pray," the Indian suiting the action to the word, and kneeling in the attitude which the track showed the missionary had assumed. Now he faced the wind and ran against the blinding snow and pitiless storm; here he turned his back again; there his tracks showed how he slipped and fell, and once again where he knelt to pray. The marks of his fingers were seen on the crust of snow lying in frozen patches on the ice. Once more he fell, rose again, knelt for a while, and made a last effort to push against the storm. They came at length to where he had fallen for the last time, and subsequently knelt with his hands on the ice, his head touching the snow. He was found with hands clasped in the attitude of prayer, his head bent upon his breast. The barking dogs at the Mission must have been aware that he was approaching, notwithstanding the gloom of evening and the drifting snow, for they bayed fiercely in the direction he was coming about the time he was supposed to have fallen. The half-breeds heard the dogs and looked out in expectation of seeing the missionary approach, but as the dogs soon ceased to bark they thought it was a false alarm, and did not go to meet and assist him.

It was painfully interesting to watch the Indians relate the narrative of this short but terrible journey from the information they had gathered on the almost trackless ice and snow. The imitation of the actions and motions of the poor missionary, his attitude of prayer, his drooping head touching the cold ice, his backward wanderings, were all so faithfully represented, so true to nature, that the reality seemed to be occurring before me, rather than the solemn mimicry of a savage.

After the Indian, who was most active in impersonating the missionary, had finished his mournful tale, he quietly took a lighted pipe from one of his companions standing by, and drawing his blanket over his head seated himself upon the prostrate trunk of a tree, and without any expression of feeling covertly glanced in my face to see the effect of his narrative; and when I asked him through the half-breed interpreter where the body was lying, he coldly pointed with one finger to a log-hut close by, without withdrawing the pipe from his mouth or showing any further interest in the matter.

The name of the missionary was Laurenz Lautiger, from Krainburg in Carniola; he had been placed by the half-breeds in a rough coffin made from half-a-dozen pine boards, and, as he lay robed in his priestly vestments, calm, and without any trace of suffering, it seemed almost impossible to realize that he had just met with death in such a terrible form.

When we arrived at Crow Wing, a few days after this sad occurrence, I went to see his brother missionary stationed there, and related to him all the known circumstances of his death as I had received them from the half-breeds and Indians of Red Lake, and then learned that the Rev. Laurenz Lautiger was an Austrian, a man well skilled in many languages, pious, devoted and most enthusiastic in his endeavours to christianize the Ojibways of Red Lake. He had not been long in the country or he would have had the experience necessary to guide him on such a night as that in which he met with his untimely fate. At the hour of his death we must have been encamped on Red Lake River, about fifty miles from the station, having made an early camp in consequence of the piercing cold. My thermometer in the woods showed twenty-two degrees below zero just before I rolled myself in my buffalo robe for the night; but as we had selected close woods for our night's resting-place, it is not improbable that the temperature on the exposed ice of Red Lake was as low as thirty below zero.

Our course from Red Lake lay through the woods bordering Red Lake River. We traversed three very picturesque sheets of frozen water, and then arrived at Opashkwa Lake, which lies at the foot of the dividing ridge constituting the height of land, the waters on one side flowing into Hudson's Bay, on the other into the Gulf of Mexico. After passing this natural boundary we crossed Turtle Lake, and numerous dilatations of Turtle River abounding in wild rice, and camped on the evening of the 10th December close to the borders of Cass Lake, and near a cluster of Indian wigwams. Shortly after midnight our dogs began to bark furiously, and the Indian camp seemed suddenly to receive an unusual influx of visitors. Cline came to me and whispered, "Monkman's come." At daybreak on the following morning I recognized Monkman's dogs fraternizing with Cline's, and a short stroll to the Indian camp satisfied me that his party had all arrived in good condition, and were distributed among the different wigwams. I found Lord Cavendish and Mr. Ashley in one tent, and Mr. Seymour in another, as comfortably "fixed" as it was possible to expect or wish for under the circumstances incident to a midnight journey from the summit of the Mississippi slope, with the thermometer at zero.

A mission was established at Cass Lake in 1844, and the condition of the Indians is reported to have been much ameliorated by the exertions of the missionaries. The Indian village is situated on both sides of Turtle River, and contains several log cabins erected by the natives. No spirituous liquor is permitted to be introduced into this part of the Indian Reserves in Minnesota. The prosperity of the Indians, and their gradual approach to civilization, is probably largely due to this prohibition.

Starting several hours in advance of Monkman, we arrived early in the afternoon at the Indian agency and village on the south shore of Leech Lake, and were very cordially received by the agent. The other travelers came up with us before nightfall, and the half-breeds of the united parties decided upon having a dance. Fiddles were soon procured, a capacious store was cleared of goods and packages, and the female population of the agency and village, which included some very passable half-breed girls and "wives," having promptly assembled, a series of lively dances commenced, which were kept up until midnight. In the absence of whisky, that curse of savage and half-civilized life, strict propriety of demeanour was maintained throughout, although there was no lack of merriment, joke, and song. The scene was rendered more striking and characteristic of the wild life of these remote woods, by the presence of some Indians who were attracted from a neighbouring camp by the unusual sounds of music and dancing.

Monkman started a few minutes before us on the following morning, and we had the advantage of the road he made, which, however, was not much gain, as a good track had already been formed between Leech Lake and Crow Wing. After a fair day's journey through magnificent pine forests, both parties camped close together, about forty-four miles from our destination.

Cline began to pluck up his courage, which had received a check when he found Monkman pushing on until midnight in order to overtake us at Cass Lake. If we had not been compelled to wait for the heavily laden sledges we should have made much longer daily journeys, and no doubt Monkman would have traveled more rapidly. Fifty miles a day with light carioles and good dogs, would not have been out of the way. On the night of the 12th we slept for the last time in the woods, and both travelers and half-breeds looked forward with some anxiety to the race on the morrow. Monkman and Cline had agreed that both parties should start together in the order in which they camped, and our fire was made about one hundred yards in advance of Monkman's.

We rose at three and started at five; the thermometer showed a few degrees below zero, but the air was still, and the almost illimitable pine forest completely hushed, not the slightest breath disturbing the tall and light tops of the trees. We ran on in silence for half an hour, the hungry dogs themselves appeared to be sensible that their long journey was drawing to a close, for scarcely a note of encouragement or reproval was uttered by the half-breeds. My cariole led the way, the others of my party following close in the rear. Some forty minutes after we had started, the dogs being thoroughly warm at their work, we heard a yelp far behind us. Cline whispered to me, "Monkman's passing them;" and during each succeeding five minutes yelp after yelp announced that the other trains were being passed, until in little more than an hour from our start I heard Monkman's well-known voice close behind me. Without speaking a word he and the cariole he was driving passed mine. A thrill of excitement ran through me when I felt the warm breath of his powerful dogs beat upon my face, as the noble creatures swiftly trotted past. Neither dogs nor men, nor the muffled-up inmates of the carioles made any sign. One after the other Mr. Seymour, Lord Cavendish, and Mr. Ashley, flitted noiselessly by. Cline whispered again, "They'll make a good road, my dogs will not be far behind."

It is impossible to describe the feelings which this rapid, silent, gliding through those vast pine forests inspired. Morning dawned slowly, but the gloom of the forest seemed to grow more intense as I occasionally caught glimpses of the brightening sky above. The sun rose without a cloud, gilding the tops of tall trees with an indescribable lustre, beautifully reflected by the snow wherever the golden light penetrated. After a run of twenty-six miles Cline came up with Monkman a few minutes after he had stopped for dinner. Mr. Dickinson followed close behind me, and in another hour both parties were together again. The next run was to bring us to Crow Wing, between nineteen and twenty miles distant. Starting in the order in which we arrived at the camping ground, we hurried at a rapid gallop down the Mississippi slope; and here the race began in earnest. The road was in excellent condition, the day bright and cold, the dogs eager and hungry, and the men and travelers in good condition and in excellent spirits. After a splendid gallop of twenty miles we entered Crow Wing in the following order and close together :—Lord Cavendish first, Mr. Seymour second, Mr. Hind third, Hon. Mr. Ashley fourth, Mr. Dickinson fifth, Mr. Fleming sixth, the rest nowhere.

CHAP. XXVIII.

INDIAN WEALTH. — THE BUFFALO. — THE HORSE AND THE DOG.

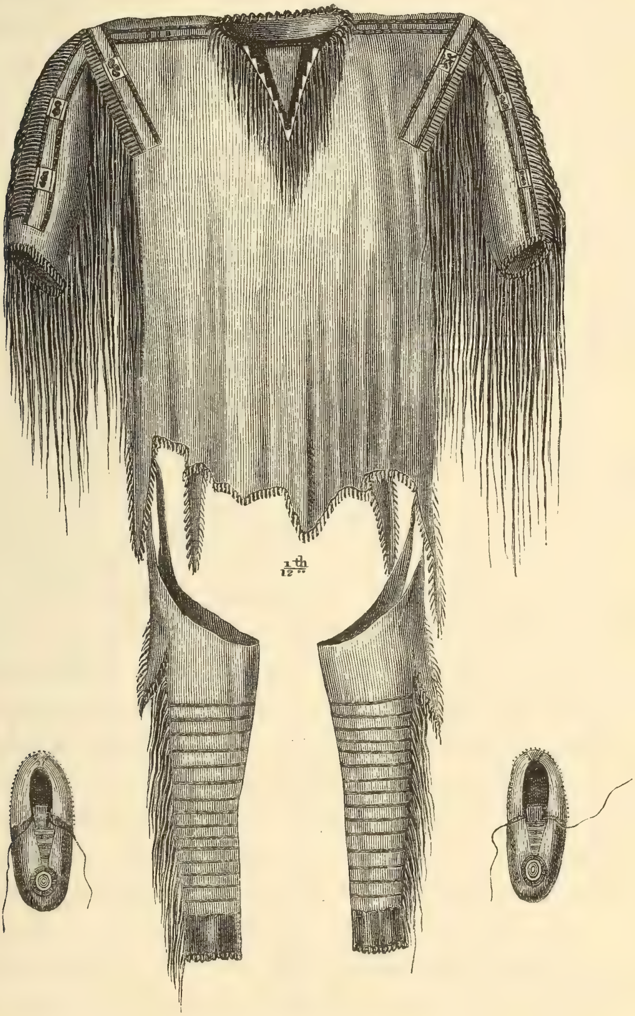
The Bison or Buffalo.—Its Value.—Two kinds of Buffalo reported to exist by Half-breeds.—The Plain Buffalo and the Wood Buffalo.—The Lithuanian Bison.—Characters of.—Former range of the Buffalo.—Modern Range of.—The Red River Bands.—The Saskatchewan Bands.—Wintering Quarters of the north-western Bands of Buffalo.—Summer Ranges.—Systematic Migration of.—Buffalo Hunt.—Census of Red River Half-breed Hunt.—Blind Buffalo.—Crossing of Buffalo with domesticated Cattle.—Character of mixed Breeds.—The Horse.—Training of Horses.—Docility of.—Illustrations.—Attachment of Indians to their Horses.—Hopplings.—Smokes.—The Dog.—Its Uses.—The Midnight Howl.—Dog Feasts.—Dogs at the Hudson's Bay Posts.—Voracity of.—Cross with the Wolf.—Sacrifice of Dogs.

The flesh of the bison or buffalo either in the form of "fresh meat," "dried meat," or "pemmican" has been the main stay of the fur trade in Rupert's Land for more than three quarters of a century. Without the buffalo it would have been impossible to have supported the large establishments on the Saskatchewan, or to have made the long voyages from the Rocky Mountains to Hudson's Bay, much less to have carried on that vast system of internal communication which employs upwards of two hundred boats, averaging four tons each, and manned by more than one thousand two hundred voyageurs.

It is, however, to the wandering and savage tribes of the great prairies that the buffalo is all-important. This huge and unwieldy animal, together with the horse and the dog, occupy the same relation to Prairie Indians that domesticated animals and the productions of the farm and the forest bear to civilized races. During the greater part the year the Prairie Indians follow the buffalo, and not only subsist upon its flesh, but from its skin and sinews they make their tents, clothing, saddles, bow-strings and dog harness. The hide cut into strips serves them for cordage, the sinews split into threads for twine. The dried dung is often their only fuel for weeks together on the treeless plains between the Assinniboine and the Grand Coteau, and on the South Branch of the Saskatchewan. Dried meat, pemmican, marrow, soft fat, sinews, dressed skins and robes, all from the buffalo, form their articles of commerce, in exchange for which they demand tea, which is now becoming a most coveted luxury, tobacco, powder and shot, and if possible, rum. It may truly be said that they exist on the buffalo, and their knowledge of the habits of this animal is consequently essential to their preservation.

The existence of two kinds of buffalo is firmly believed by many hunters at Red River; they are stated to be the prairie buffalo and the buffalo of the woods. Many old hunters with whom I have conversed on this subject, aver that the so-called wood buffalo is a distinct species, and although they are not able to offer scientific proofs, yet the difference in size, colour, hair, and horns, are enumerated as the evidence upon which they base their statement. Men from their youth familiar with these animals in the Great Plains, and the varieties which are frequently met with in large herds still cling to this opinion. The buffalo of the plains are not always of the dark and rich bright brown which forms their characteristic colour. They are sometimes seen from white to almost black, and a grey buffalo is not at all uncommon.

Buffalo emasculated by wolves, are often found in the prairies, where they grow to an immense size; the skin



Sioux Dress and Mocassins..

of the buffalo ox is recognized by the shortness of the wool and by its large dimensions. The skin of the so-called wood buffalo, is much larger than that of the common animal, the hair is very short, mane or hair about the neck, short and soft, and altogether destitute of curl, which is the common feature in the hair or wool of the prairie animal. Two skins of the so-called wood buffalo, which I saw at Selkirk Settlement, bore a very close resemblance to the skin of the Lithuanian bison, judging from the specimens of that species which I have since had an opportunity of seeing in the British Museum.

The wood buffalo is stated to be very scarce, and only found north of the Saskatchewan, and on the flanks of the Rocky Mountains. It never ventures into the open plains; the prairie buffalo, on the contrary, generally avoids the woods in summer and keeps to the open country; but in winter they are frequently found in the woods of the Little Souris, the Saskatchewan, the Touchwood Hills, and the aspen groves on the Qu'appelle. There is no doubt that formerly the prairie buffalo ranged through open woods almost as much as he now does through the prairies.

Great Slave Lake is the northern limit of the buffalo, and the country between that large body of water and the Saskatchewan is partially wooded. The buffalo are now found in considerable numbers on the east flank of the Rocky Mountains. The former limits of the wanderings of these animals are carefully recorded in the narrative of Major Long's Expedition to the sources of the St. Peter's River. It appears that the buffalo was formerly found throughout the whole territory of the United States, with the exception of that part which lies east of Hudson's River and Lake Champlain, and of narrow strips of coast on the Atlantic and the Gulf of Mexico. These were swampy, and had probably low thick woods. That it did not exist on the Atlantic coast is rendered probable from the circumstance that all the early writers whom Mr. Colhoun the astronomer to Major Long's Expedition consulted on the subject, do not mention the buffalo as existing there, but further back. There can be no doubt that the animal approached the Gulf of Mexico, near the Bay of St. Bernard, for Alvar Nunez, about the year 1535, saw them not far from the coast, and Jontel, one hundred and fifty years afterwards, saw them at the Bay of St. Bernard. It is probable that this bay is the lowest point of latitude at which this animal has been found east of the Rocky Mountains.

Its existence on the west side of the Rocky Mountains is well ascertained, although it was not seen by the early explorers of that region.

At present it is scarcely seen east of the Mississippi, and south of the St. Lawrence. Governor Cass's party found, in 1819, buffaloes on the east side of the Mississippi, above the falls of St. Anthony. Every year this animal's rovings are restricted. In 1822, the limit of its wanderings down the St. Peter was Great Swan Lake.*

The ranges of the buffalo in the north-western prairies are still maintained with great exactness, and old hunters, if the plains have not been burnt, can generally tell the direction in which herds will be found at certain seasons of the year. If the plains have been extensively burnt in the autumn, the search for the main herds during the following spring must depend on the course the fires have taken.

Red River hunters recognize two grand divisions of buffalo, those of the Grand Coteau and Red River, and those of the Saskatchewan. Other ranges of immense herds exist beyond the Missouri towards the south, as far as Texas and Mexico. The north-western buffalo ranges are as follow. The bands belonging to the Red River Range winter on the Little Souris, and south-easterly towards and beyond Devil's Lake, and thence on to Red River and the Shayenne. Here too, they are found in the spring. Their course then lies west towards the Grand Coteau de Missouri, until the month of June, when they turn north, and revisit the Little Souris from the west, winding round the west flank of Turtle Mountain to Devil's Lake, and by the main river (Red River), to the Shayenne again. In the memory of many Red River hunters, the buffalo were accustomed to visit the prairies of the Assinniboine as far north as Lake Manitobah, where in fact their skulls and bones are now to be seen; their skulls are also seen on the east side of the Red River of the north, in Minnesota, but the living animal is very rarely to be met with. A few years ago they were accustomed to pass on the east side of Turtle Mountain through the Blue Hills of the Souris, but of late years their wanderings in this direction have ceased; experience teaching them that their enemies, the half-breeds, have approached too near their haunts in that direction.

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* Major Long's Expedition to the Sources of the St. Peter's River.

The country about the west side of Turtle Mountain in June 1858 was scored with their tracks at one of the crossing places on the Little Souris, as if deep parallel ruts had been artificially cut down the hill-sides. These ruts, often one foot deep and sixteen inches broad, would converge from the prairie for many miles to a favourite crossing or drinking place; and they are often seen in regions in which the buffalo is no longer a visitor.

The great western herds winter between the south and the north branches of the Saskatchewan, south of the Touchwood Hills, and beyond the north Saskatchewan in the valley of the Athabaska; they cross the South Branch in June and July, visit the prairies on the south side of the Touchwood Hill range, and cross the Qu'appelle valley anywhere between the Elbow of the South Branch and a few miles west of Fort Ellice on the Assinniboine. They then strike for the Grand Coteau de Missouri, and their eastern flank often approaches the Red River herds coming north from the Grand Coteau. They then proceed across the Missouri up the Yellow Stone, and return to the Saskatchewan and Athabaska as winter approaches, by the flanks of the Rocky Mountains. We saw many small herds, belonging to the western bands, cross the Qu'appelle valley, and proceed in single file towards the Grand Coteau in July 1858. The eastern bands, which we had expected to find on the Little Souris, were on the main river (Red River is so termed by the half-breeds hunting in this quarter). They had proceeded early thither, far to the south of their usual track, in consequence of the devastating fires which swept the plains from the Rocky Mountains to Red River in the autumn of 1857. We met bulls all moving south, when approaching Fort Ellice; they had come from their winter quarters near the Touchwood Hill range. As a general rule the Saskatchewan bands of buffalo go north during the autumn, and south during the summer. The Little Souris and main river bands, go north-west in summer and south-east in autumn. It is almost needless to remark again that fires interfere with this systematic migration, but there are no other impediments which will divert the buffalo from their course. The half-breeds state that no slaughter by large parties of hunters or Indians can turn large herds from the general direction they have taken when on the march; want of food is alone able to make them deviate from the course they have taken. The approach of numerous herds can be recognised by a low rumbling sound they occasion, if the weather be calm, fully twenty miles before they arrive, this warning is best perceived by applying the ear to a badger hole. During the rutting season they can be heard bellowing for a great distance on a still night. When we arrived at the Sandy Hills on the South Branch, the Crees, on being asked if the buffalo were numerous near at hand, answered, "listen to-night and you will hear them."

The summer and fall buffalo hunts are the grand events of the year to the Red River settlers, in fact the chief dependence for a livelihood of the greater part of the population. The start is usually made from the settlements about the 15th of June for the summer hunt, the hunters remaining in the prairie until the 20th August or 1st of September. One division (the White Horse Plain) goes by the Assinniboine River to the "rapids crossing place," and then proceed in a south-westerly direction. The other, or Red River division, pass on to Pembina, and then take a southerly direction. The two divisions sometimes meet, but not intentionally. Mr. Flett in 1849 took a census of the White Horse Plain division near the Chiefs' Mountain, not far from the Shayenne River, Dacotah Territory, and enumerated 603 carts, 700 half-breeds, 200 Indians, 600 horses, 200 oxen, 400 dogs and one cat.

Mr. Ross * gives the following census of the number of carts assembled in camp for the buffalo hunt at five different periods :—

In 1820.	Number of	carts assembled	for the first trip	540
In 1825	”	”	”	680
In 1830	”	”	”	820
In 1835	”	”	”	970
In 1840	”	”	”	1210

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* The Red River Settlement, its rise, progress, and present state. London. 1856.

After the start from the settlement has been well made, and all stragglers or tardy hunters have arrived, a great council is held, and a president elected. A number of captains are nominated by the president and people jointly. The captains then proceed to appoint their own policemen, the number assigned to each not exceeding ten. Their duty is to see that the laws of the hunt are strictly carried out. In 1849, if a man ran a buffalo without permission before the general hunt began, his saddle and bridle were cut to pieces, for the first offence; for the second offence of the same description his clothes were cut off his back. At the present day these punishments are changed to a fine of twenty shillings for the first offence. No gun is permitted to be fired when in the buffalo country before the "race" begins. A priest sometimes goes with the hunt, and mass is then celebrated in the open prairies. At night the carts are placed in the form of a circle with the horses and cattle inside the ring, and it is the duty of the captains and their policemen to see that this is rightly done. All laws are proclaimed in camp, and relate to the hunt alone. All camping orders are given by signal, a flag being carried by the guides, who are appointed by election. Each guide has his turn of one day, and no man can pass a guide on duty without subjecting himself to a fine of five shillings. No hunter can leave the camp to return home without permission, and no one is permitted to stir until any animal or property of value, supposed to be lost, is recovered. The policemen, at the order of the captains, can seize any cart at night-fall and place it where they choose for the public safety, but on the following morning they are compelled to bring it back to the spot from which they moved it the evening previous. This power is very necessary in order that the horses may not be stampeded by night attacks of the Sioux or other Indian tribes at war with the half-breeds. A heavy fine is imposed in case of neglect in extinguishing fires when the camp is broken up in the morning. In sight of buffalo, all the hunters are drawn up in line, the president, captains, and police being a few yards in advance, restraining the impatient hunters. Not yet, not yet, is the subdued whisper of the president; the approach to the herd is cautiously made. Now! the president exclaims, and as the word leaves his lips the charge is made, and in a few minutes the excited half-breeds are among the bewildered buffalo.

Blind buffalo are frequently found accompanying herds, and sometimes they are met with alone. Their eyes have been destroyed by prairie fires; but their quickened sense of hearing and smell, and their increased alertness enable them to guard against danger, and makes it more difficult to approach them in quiet weather than those possessing sight. The hunters think that blind buffalo frequently give the alarm when they are stealthily approaching a herd in an undulating country. When galloping over stony ground blind buffalo frequently fall, but when quietly feeding they avoid the stones and boulders with wonderful skill. The domestication of the buffalo is a subject of much interest to the future population of Red River, and the following information on that subject may be implicitly relied on.

Humboldt* says that Albert Gallatin, who, before he appeared in Europe as a distinguished diplomatist, had obtained by personal inspection great knowledge of the uncultivated part of the United States, assures us that "the mixed breed was quite common fifty years ago in some of the north-western counties of Virginia; and the cows, the issue of that mixture, propagated like all others." "The favourite food of the buffalo is *Tripsacum dactyloides* (buffalo grass) and an undescribed species of clover nearly allied to *Trifolium repens*, and designated by Barton as *Trifolium bisonicum.* According to the statement of Gomara, there was still living in the north-west of Mexico, in latitude 40°, an Indian tribe whose principal riches consisted in herds of tame bisons or buffalo. But notwithstanding the possibility of taming the bison, notwithstanding the quantity of milk it yields, and notwithstanding the herds of lamas in the Cordilleras of Peru, no pastoral life or pastoral people were found when America was discovered, and there is no historical evidence of this intermediate stage in the life of nations ever having existed there."

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* Aspects of Nature.

In a description of domesticated herds of buffalo, and the results of crossing with the common cow, from the Patent Office Reports, it is stated that the mixed breeds are of various colours; striped with black on a grey ground, like the zebra; some others brindled red; some pure red, with white faces: and others red, without any markings of white. The mixed bloods have not only produced from the tame and buffalo bull, but it is known that the half-bloods reproduce, viz. those that were the product of the common cow and wild buffalo bull. At the first settlement of the country, cows that were considered the best for milking were the half-blood down to the quarter, and even eighth, of the buffalo blood. But the writer's experiments have not satisfied him that the half buffalo bull will produce again. That the half-breed heifer will be productive from either race, he has tested beyond the possibility of doubt.

"The domesticated buffalo retains the same haughty bearing that distinguishes him in his natural state. He will, however, feed or fatten on whatever suits the tame cow, and requires about the same amount of food. I have never milked either the full-blood or mixed breed, but have no doubt they might be made good milkers, although their bags or udders are less than those of the common cow; yet, from the strength of the calf, the dam must yield as much, or even more milk, than the common cow."*

Next to the buffalo the horse is the mainstay of the prairie Indians. Good horses are not very common among the Crees; they are, however, very intelligent and well trained. A good buffalo runner is invaluable to them, for although it does not require a fast horse to catch a bull, the cows, possessing greater speed, often outstrip them. A good Indian horse possesses some excellent characteristics, the result of training, which it may be interesting to enumerate, for the purpose of exhibiting how admirably this animal serves his rude and savage masters. When galloping after a buffalo, an Indian horse watches the animal as intently as his rider, always swerving when he observes the buffalo's tail begin to vibrate, and breaking into short gallop at his utmost speed when he sees the tail erect, a sure indication of an immediate charge. The rider may with safety entrust himself to his horse if mounted on a trained buffalo runner; he will be carried within three yards of the flanks of the animal, and safely withdrawn when danger is threatened. If the horse stumbles and throws his rider, the sagacious animal stops instantly and waits for him to mount again. A happy instance happened to myself when riding a fiery grey mare an Ojibway Indian lent me to gallop from his tent to Manitobah House, a distance of ten miles. "She is my favourite buffalo runner, said the Indian, and will not need the thong." She ran away with me, however, as soon as we reached a grassy opening about a mile across, and in the midst of her gallop the belly band broke, and the little Indian saddle slipping round, I was thrown at once on the soft turf. The mare stopped immediately, turned round and stood by my side, waiting until I had risen and adjusted the saddle. As soon as I mounted she started off again, as if my sudden and unexpected descent had been intentional. At another time, when driving a small cariole over the frozen waters of Red River, the horse, an Indian one, not being roughshod, slipped and fell, but without an effort to rise remained perfectly quiet until I had loosened the harness, when he scrambled up, gained a rough portion of ice, and quietly waited to be harnessed afresh.

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* U. S. Patent Office Report.

Indian horses are excellent watchers by night; our half-breeds were accustomed to note with care the aspect of the horses before retiring to rest; if they showed the least signs of uneasiness, such as staring about them instead of feeding quietly, or, when feeding with the "bite" in their mouth, stopping to listen, or snuffing the air, or approaching the fires when the flies where not troublesome, they would look for the cause and sometimes set watchers. When during the night, however dark, the horses suddenly approached the carts, the half-breeds would go to them, caress them, and watch the direction in which they fed or looked, knowing that their heads would be turned towards the danger, whether of Indians, or bears, or wolves.

One more instance will suffice to show the docility and training of Indian horses. I was riding a small horse which we had procured from the Crees on the Qu'appelle, in company with a Blackfoot half-breed, some distance before the carts, in the valley of Long Creek.* As we ascended a low hill we saw a bear 250 yards before us. My companion could speak but few words of English, so with signs he motioned me to dismount, and, having satisfied himself that the horses saw the bear, he led them a few yards aside behind a clump of willows, and tying their bridles together he patted them on the neck and pointed to the bear, caressed them again, and afterwards motioned me to follow him. The horses, with pricked ears, followed with their eyes every movement of the bear now slowly moving from us, but occasionally stopping to crop the twigs of willow. We crawled to leeward, and got within seventy yards of the bear, he then perceived us, I fired and sent a ball through his lungs. We waited to see if he would rise again, but finding that he lay struggling on his back, we approached and despatched him. On looking round for the horses they were seen standing in the same place intently watching us. My companion called them, they came slowly up and stopped within forty yards, eyeing the bear all the time. Finding that we approached it and handled it, they began to feed, evidently being satisfied that it was harmless.

Prairie Indians become very much attached to their horses, if they succeed in getting possession of a valuable animal. They often keep him in a tent when in the neighbourhood of an enemy's country or among noted thieves of their own tribe. During the daytime, when the camp is well supplied with meat and the buffalo are near, they tether him in the prairie, and indolently stretching themselves at full length on the grass, patiently watch him feed, removing the stake to a fresh spot as soon as he has cropped the best portion of the area limited by his tether. At night, when it was not thought necessary to tether our horses, we always hoppled them, that is tied their fore-feet together with dressed buffalo hide. Iron hopplings are in great request among half-breeds on their hunting expeditions. They can then more safely allow their horses to feed some distance from the camp, but instances have been known of Indians who have succeeded in approaching and catching a horse furnished with iron hopplings, in revenge for their disappointment at not being able to gallop away with their prize, sending an arrow through the animal or otherwise seriously injuring him. During the fly season, smokes are made every night for the horses, and if this precaution is neglected they will remind their masters of their want of care by surrounding the camp fire and standing with their heads in the smoke. It is this habit of crowding round the smoke of a fire to avoid the torment of flies which makes Indian horses so difficult to drive from a prairie on fire. Many are burned every year on account of their being unable to comprehend the danger which threatens them. The buffalo are more wary, the smell of fire is often sufficient to drive them from pastures where they have been quietly feeding.

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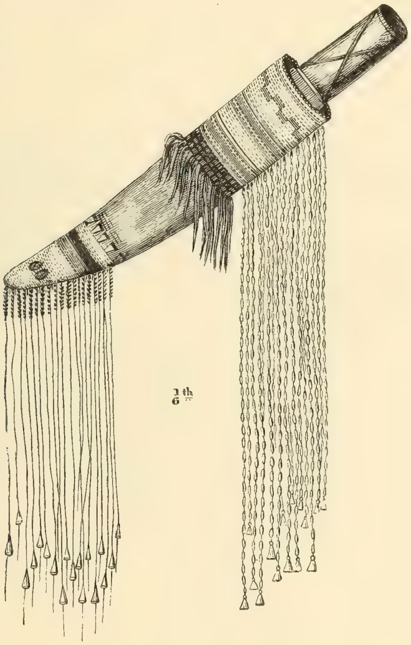
* Long Creek flows into the Main Saskatchewan, near Fort à la Corne.

Next to the horse, the dog is the Prairie Indian's most valuable friend. The dog is the great stand-by of the squaws, who have to attend to all the duties of the camp, the men employing themselves solely in hunting and fighting. The dogs drag on poles the camp furniture, the provisions, the little children, and all the valuables of the family. It is a very amusing sight to witness several hundred dogs solemnly engaged in moving a large camp. They look wistfully at passers-by, and take advantage of the least want of attention on the part of their mistresses to lie down, or snarl and snap at their companions in the work. They nevertheless obey the word of command with alacrity and willingness if not fatigued.

The midnight howl of three or four hundred dogs is an awful and appalling sound. It rises suddenly from a low prolonged whine to a deep melancholy howl, caught up again and again to the distraction of tired travelers anxious to take rest in sleep. When any great event takes place, a dog feast is proclaimed, and it is sufficiently disgusting to see the men handle and feel the unfortunate animals as if they were sheep, with a view to select the fattest, so powerful are early habits and associations in directing our feelings and tastes. Although some of the Indian dogs we saw among the Crees of the Sandy Hills are large and ferocious looking animals, we never found them vicious or inclined to attack us ; they were always deterred from approaching by the sight of a stick or a feint at picking up a stone.

Although I made many inquiries, the Indians could give no information respecting the occurrence of hydrophobia among their dogs, and the same observation, as far as I could discover, applies to the dogs so numerous at Red River, and at the different Posts of the Hudson's Bay Company. Large numbers of dogs are kept at the Company's Posts to haul sledges during winter ; in summer time they are fed on fish at fishing stations ; in the prairie they feed upon the offal of buffalo. Dogs will go for a week without food, and yet get into condition for traveling, if well fed, in a fortnight or eighteen days. At Manitobah House I saw them devour large pike alive, which were thrown to them as they were taken from the nets. Indian dogs are terrible thieves, especially those originating from a cross with the wolf. It was necessary to place out of reach or under cover every article bearing the least resemblance to leather when we were among the Crees. A careless half-breed would wake in the morning and find his harness eaten, or his whip devoured ; and it sometimes happened that the long tether of buffalo hide would be found partly consumed by dogs if their appetite had not been lately appeased. The wolves have this trick also when food is scarce, especially when the tether is allowed to trail loosely from the horse's neck without being attached to a stake, thus leaving him at liberty to wander some distance from the camp during the night. The intelligence of dogs when traveling during the winter is astonishing, several curious instances occurred during our homeward journey, which will be found in the narrative of the winter journey to Crow Wing.



Sioux Knife Sheath.

With Crees, Ojibways, Swampys, and Sioux, the dog is supposed to be the most acceptable sacrifice to offended deities, five dogs being the common number for a propitiatory offering.

CHAP. XXIX.

INDIAN CUSTOMS AND SUPERSTITIONS.

Indian Antiquities.—Result of the Fur Trade.—Ojibways Invaders of the Prairies.—Scalp Dance.—Wood Indians.—Occupations of Indians.—Indian Cruelty.—Mis-tick-oos, Chief of the Crees of the Sandy Hills.—The Fox. — Treatment of Prisoners. — Medicine Ceremonies. — Happy Hunting Grounds.—Indian "Medicine" Men and "Medicines."—Influence of Conjurors.—Manitou Dwellings.—Manitobah Island.—The Rev. Mr. Cowley. —Sacrifices.—Character of Indians.—Mis-tick-oos' best Wife.—Mis-tick-oos' Son's Wife.—Decorating the Skin.—Indian Pipes.—Tà-wâ-pit's Pipe. —Pipes peculiar to Tribes.—Salutations among Indians.—Indians in the Prairie.—Impounding the Buffalo.—In Sickness.—Idea of Lightning.

Indian antiquities are rarely found in the valley of the Saskatchewan south of the North Branch. The customs of wandering tribes inhabiting a prairie country are generally opposed to the rude arts which exist among barbarous races preserving a fixed abode. Not even at the fishing stations on the lakes and rivers, where different tribes have congregated at certain seasons of the year, probably for centuries, do we find any lasting memorials of individual handicraft or combined labour.

Antiquities to be ascribed to different races than those which now occupy the country exist here and there. Such are the underground houses on Rainy River, the Mandan houses with their intrenchments on the Little Souris; but with these exceptions no other ancient monuments were seen during the explorations.

The rings of stones marking the site of Cree encampments on the Qu'appelle are of comparatively modern date, and belong doubtless to the ancestors of the present races now in possession of the country.

Rude pottery and arrow heads have been found at Red River settlements, about two feet below the surface of the soil. The fragments resemble those common in many parts of Canada, and from their numbers lead to the inference that at a remote period the banks of this stream were peopled by races familiar with the art of making vessels from clay.

Indian Hunters' Tents in the rear of Fort Garry.

One result of the active pursuit of the fur trade for upwards of a century in the valley of the Saskatchewan, is seen in the blending of the different tribes by intermarriage. The Crees of the Plains and the Ojibways and Swampys of the Woods, although speaking different languages, are often found hunting the buffalo in company, and not unfrequently form family connections. The Ojibways of Lake Winnipeg may now be discovered, summer and winter, near the Grand Forks of the Saskatchewan, having emigrated 400 miles west of Red River, where they have permanently established themselves. All the Ojibways now found west of the Lake of the Woods, and the east coast of Lake Winnipeg are invaders of the country. The real home of the Ojibway is the region about the south, west, and north of Lake Superior; the habits of life of the emigrants or invaders have been adapted to the character of the country they now occupy, and being no longer dependent upon the forest for food and clothing, many of them, on the banks of the Assinniboine, Red River, Lake Manitobah, and Dauphin Lake, possess horses, and join the half-breeds in their annual spring and fall hunts. Notwithstanding this intercourse and blending of different nations, most of the superstitions and customs peculiar to each are still maintained and practised.

Nearly one hundred years ago (1770), Mr. Hutchins, of the Hudson's Bay Company's service, framed an enumeration of the tribes between Lake Winnipeg, and within one hundred miles of James's Bay, speaking the Ojibway tongue. The tribes enumerated have evidently derived their names in conformity with long established usage, from their hunting and fishing stations.

It is often asked whether the thrilling descriptions of savage life in Cooper's delightful romances are imaginary or real; and if real, whether they exist now among the tribes which have long been familiar with civilized man, such as the Plain Crees, the Sioux, the Swampys, and the Ojibways. It is enough to visit the secluded Ojibway graves on the banks of Red River, and contemplate Sioux scalps decorated with beads, bits of cloth, coloured ribbons, and strips of leather, suspended at the extremity of a long slender stick near the head of the grave, to feel satisfied that one barbarous custom still prevails. But to be an eyewitness of a scalp dance, or a skull dance, is more than sufficient to press home the conviction that the fiendish passions so faithfully described by Cooper, still find expression in violent gesture, loud vociferation, triumphant song and barbarous feasting, with undiminished strength and bitterness, even after a century's intercourse with civilized man.

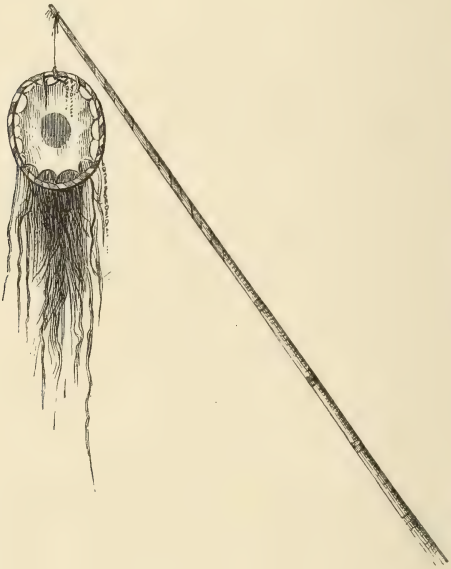
Some of the incidents narrated in the following pages will show how far old superstitions and customs prevail among the Indians occupying the country between Red River and the South Branch of the Saskatchewan.

Early in the spring of 1858 the warlike bands of Ojibways called the Lac la Pluie Indians, were thrown into a state of savage excitement by the arrival of messengers from their friends on Red River, with tidings that two Sioux had been killed and scalped in the Plains. In testimony of this triumph, they brought with them two fingers severed from the hands of the unfortunate Sioux. The announcement of the intelligence that the scalps would be sent, after their Red River brethren had celebrated war dances over them, was received with wild clamour and shouting. After the scalps had been carried from hand to hand and the victory that won them triumphed over with dancing, singing, and feasting, they would be returned to the warriors who took them, and finally suspended over the graves of relatives or friends mourning the loss of any of their kindred by the hands of the Sioux.

The Crees, Ojibways, and Swampys, belonging to the great body of Wood Indians, assemble in the spring of the year to celebrate their medicine feasts and other ceremonies, which are generally determined by the arrival of migratory birds, or the time when the sturgeon begin to ascend the rivers. The day on which the annual goose dance takes place is regularly entered in the journals of

Fort à la Corne and other Posts of the Hudson's Bay Company. In the woods on the main Saskatchewan behind Fort à la Corne, as well as in several places on the banks of the Little Saskatchewan, Winnipego-sis, and Dauphin Lakes, we found the carved and painted posts which are made to play an important part in these observances. (Vol. I. p. 402.)

During the summer they separate into families or small bands, and hunt, fish, or go to the Plains in search of buffalo. At the approach of winter, they "take debt" or otherwise obtain supplies at the different Posts of the Company, and retire to their winter quarters to trap the fur-bearing animals. The Plain or Prairie Indians follow the buffalo, and vary the monotony of their existence by forming war parties against their enemies, such as the


Sioux Scalp from the Graves at Red River.

Plain Crees against the Sioux and the Blackfeet, the Ojibways against the Sioux, and Assinniboines.

In August 1858, when camped near the Elbow of the South Branch of the Saskatchewan, we found the Plain Crees hastening from the west to the east bank of the river, with a strong war party of Blackfeet in pursuit. Scouts were posted on some of the outlying sand hills on the Qu'appelle west of Sand Hill Lake, where a large party of Crees, under the direction of their chief, Mis-tick-oos*, were impounding buffalo. Both by day and night a strict watch was kept in order to guard against a surprise. Mis-tick-oos pointed out some of his band who had penetrated through the Blackfeet country to the Rocky Mountains two years ago, and returned with several scalps, grizzly bear-claw necklaces, pipes, and other trophies of success. He also related with much feeling how twenty-five young warriors had gone on a similar excursion during the summer of 1856, but none had yet returned.

About a month before we arrived at the Sandy Hills on the Qu'appelle, a large body of the Plain Crees met a portion of the Blackfeet tribe at the Eagle Hills, on the North Branch of the Saskatchewan, to arrange terms of peace. All matters went on smoothly, and the representatives of the two nations separated as friends. Some of the Crees, however, incapable of resisting the opportunity, stole some horses from the Blackfeet. They were pursued, and three of them taken. One was killed instantly, the others were led back in triumph to the camp of the Blackfeet; they were stripped, their hands were tied behind their backs, a hole was bored through both wrists and a stick passed through them and so tightly fastened that it could not be removed without assistance; the captives were then separated and dismissed singly to find their way to their friends. One only reached his tribe, and was lying in a tent not far from the spot where we were encamped.

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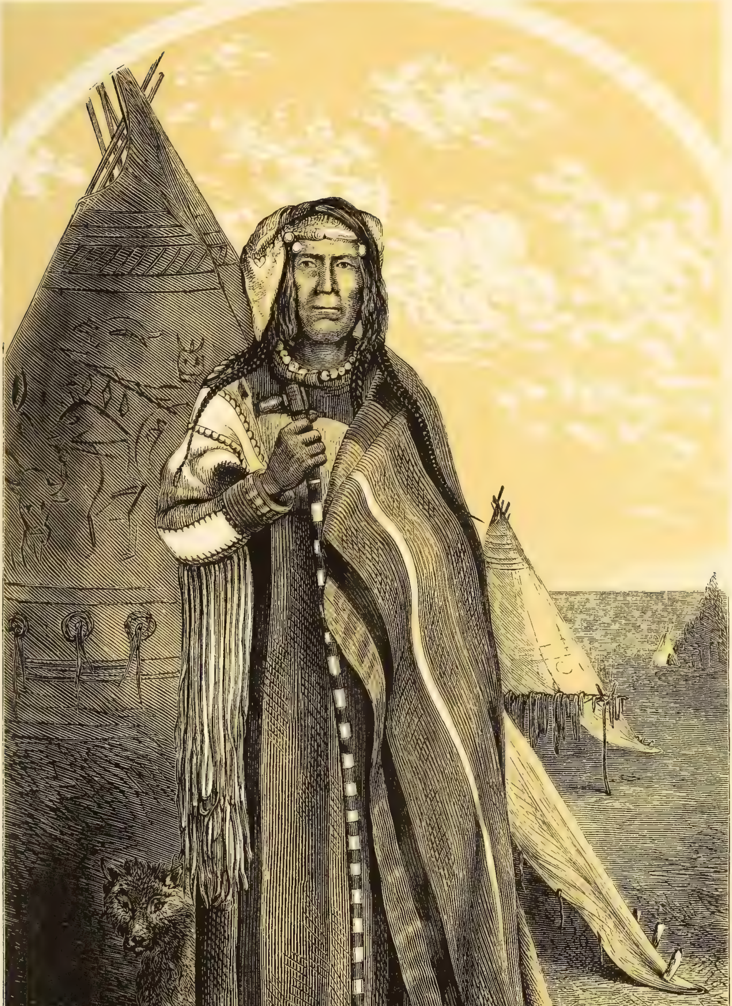
* Shortstick, or "the little tree."

Mis-tick-oos, when relating these adventures, raised the pipe he held in his hand and exclaimed, "This is what my Blackfoot friend gave me one day, the next he killed my young men; he is now my enemy again." I expressed a wish to purchase the pipe; the chief's reply was "Take it," handing it to me with a gloomy frown, and silently extending his hand for the Wapekan-cuspwägān, or clay pipe, which I was smoking at the time.

The great chief of the Plain Crees is styled "the Fox;" he is held in high estimation by all the Plain Indians with whom he comes in contact, either in peace or war. He is dreaded by the Sioux, the Blackfeet, the Bloodies, the Fall Indians, the Assinniboines, and the tribes who occasionally hunt on the Grand Coteau de Missouri and the South Branch of the Sackatchewan.

The barbarous and cruel treatment of prisoners so often described in narratives of Indian warfare, is common even now in the prairies south of the Qu'appelle and the Assinniboine. On that part of Red River which lies in the State of Minnesota, Indian warfare, with all its horrors, is constantly carried on between the Ojibways and Sioux.

Not a year passes without the loss of several Red River half-breeds by the scalping knife of the Sioux; and, as was the case in the autumn of 1858, quite close to the settlement of St. Joseph, near the boundary line, about thirty miles west of Red River. When a prisoner is taken, the Sioux sometimes adopt a terrible



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"THE FOX."—CHIEF OF THE PLAIN CREES.

mode of death during the summer season. They have been known to strip a half-breed, tie him to a stake on the borders of a marsh in the prairie, and leave him exposed to the attacks of millions of mosquitoes, without being able to move any part of his body. When the agony of fever and the torment of thirst come upon him, they leave him to die a dreadful, lingering death with water at his feet, and buzzards hovering and circling around him in greedy expectation.

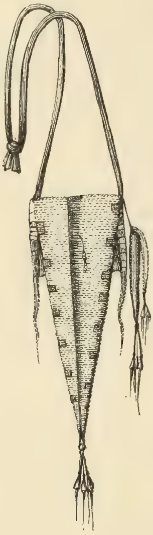
By way of illustrating the character of the medicine or conjuring ceremonies which may be witnessed during all seasons of the year when several families are encamped together, I shall describe a scene of which I was an eye-witness near the Hudson's Bay Company's Post at the Touchwood Hills. The conversation was carried on in Cree, but, I believe, faithfully interpreted to me by the officer then in charge of the Post, who was present during the incantations. The interpretation was pronounced exact by one of the Cree half-breeds attached to my party.

At the time of my arrival at this Post, a conjuror of some celebrity was endeavouring to cure a sickly woman by the exercise of his cunning. The unfortunate invalid was lying in a buffalo skin tent, while the conjuror, painted and decorated, and wearing his medicine bag, employed himself in beating a drum within a few feet of her, and singing at intervals the following words, first uttered slowly, with a pause between each word, then as in ordinary conversation, lastly, with energy and rapidity:—

"Great—is—the—man—who—walks—
In—the—middle—of—the—earth,—
He—is—the—only—true—Lord."

The word "Lord" is not employed in the sense of supreme master, but is rather intended to convey an idea of independence and individual power, and is better expressed in English, as the half-breeds informed me, by the word "gentleman."

The conjuror occasionally came out of the tent, and whenever the supposed Manitou or Fairy who was the alleged cause of the woman's illness approached, a little bell suspended from the poles supporting the tent tinkled, and gave the alarm; the conjuror immediately seized his drum, commenced his song, and by his incantations, succeeded in pacifying the Manitou. These proceedings continued for two nights; at the close of the second night, after a prolonged ringing of the little bell, violent shaking of the tent-poles, loud beating of the drum, and chanting of the words before quoted, the conjuror announced that he had discovered the reasons of the Manitou's anger, and the means to appease it.



Cree Medicine Bag.

You had a dream, said the conjuror, and when you rose in the morning you promised to make an offering to the Manitou; you have forgotten your pledge, and you are suffering in consequence of your neglect.

The woman demanded what she had dreamt, and what she promised, avowing her ignorance of both dream and promise. The conjuror told her that when the buffalo were around her tent last winter and no fear of starvation before her eyes, she had dreamed that the buffalo would always surround her, that famine and sorrow were always to be strangers to her, and, in gratitude, had vowed to make a sacrifice of her best robe. The woman, wearied no doubt with the conjuror's unceasing drum and song, probably, too, believing that a false confession was the lesser evil, as it might bring the promised relief, acknowledged that the conjuror was in the right. The penalty she was told to pay consisted of the sacrifice of "throwing away" two robes, or double the amount of the promise she had made; after which her health was to be restored.

Scenes similar to the one just described may be witnessed whenever several families are camping together; but the sacrifices required to be made depend upon the ability of the deluded creatures to satisfy the demands of the conjuror.

"The happy hunting-grounds," the heaven of Indians, so often spoken of by writers of fiction, are an actual reality in the imagination of Crees and Ojibways, as well as of other north-western tribes. A Plain Cree on the Qu'appelle gravely informed one of my men, that he had once been dead and visited the spirit world. His narrative was to the following effect:—"I was sick and fell asleep. I awoke on the bank of a deep river, whose waters were flowing swiftly and black from a great mist on the south to a great mist on the north. Many other

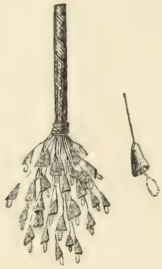
Indians sat on the banks of the river gazing at its waters, and on the gloomy shore which lay wrapped in mist on the other side. Time after time the mist before us would roll away and reveal the mouth of another great river pouring its flood into the one on whose banks I was sitting. The country to the south of this river was bright and glorious, to the north, dark and gloomy. On the one side were the happy hunting-grounds, on the other the hunting-grounds of bad Indians. Time after time my companions tried to cross the swift stream before us, in order to reach the happy hunting-grounds; some arrived in safety, others reached the north bank, and disappeared in the mist which overhung the bad country. I tried at last, but the current was too strong for me, the recollection of bad deeds prevented me from stemming the current, and I was swept on to the north shore of the opposite river. I scrambled up the bank, and spent many moons in hunting in that dreary land; always on the point of starving, or being hurt by enemies, or wet and cold and miserable. At length I came upon a river like the one I had crossed, with mists and the mouth of a great stream opposite to me; breaking clouds soon revealed happy hunting-grounds on one side, and a more gloomy and terrible country on the other. Many Indians were there before me, looking at the river and trying to cross; some succeeded, but a few were swept to the bad country, these were very wicked Indians. I tried to cross. I knew I had been a good Indian in this dreary hunting-ground. I took courage, and swam strong against the stream. I reached the happy hunting-grounds; all my sorrow disappeared as I climbed to the top of the bank and saw before me Indians numerous as grass leaves, buffalo on the distant plains thick as raindrops in summer, a cloudless sky above, and a warm, fresh, scented, happy breeze blowing in my face. I sank to sleep, and woke alone in my tent in these prairies again."

Whatever faith the Indian medicine men possess in the efficacy of their charms, it is certain that they entertain great respect for the white man's medicine. A laughable incident occurred at the Touchwood Hills. The conjuror, of whom mention has just been made, entered a room at this Post where I was sitting with Mr. and Mrs. H., who were temporarily in charge. The Indian and a companion seated themselves upon one of my boxes which contained a small medicine chest. Mrs. H. asked me to give her some sticking plaster. I crossed the room to open the medicine chest, when Mrs. H. (a half-breed) said to her husband, in the Cree language: "Will his medicines do me any harm if I stop here while he opens them?" Mr. H. answered jestingly, "Yes, you had better go into the other room." On motioning the Indians to move, they rose, and I opened the chest. The moment they saw the bottles, they hurried out of the room, hastened to the summit of a neighbouring hill, and, divesting themselves of every article of clothing, shook their garments repeatedly, and after hanging them on bushes in the sun, squatted on their haunches to await the deodorizing influence of the breeze.

In the valley of the Qu'appelle River, we frequently found offerings to Manitou or Fairies suspended on branches of trees; they consisted of fragments of cloth, strings of beads, shreds of painted buffalo hide, bears' teeth and claws, and other trifles. Our half-breeds always regarded them with respect, and never molested or liked to see us molest these offerings to Manitou. This custom prevails everywhere in the valley of Lake Winnipeg, and on the banks of the settled parts of Red

River, where the medicine drum and rattle may be heard more frequently in some parishes than the sound of church bells.

A conjuror celebrated for the potency of his charms will often exercise a very injurious influence over an entire band, consisting of ten or twelve families, in deterring them from frequenting particular hunting or fishing-grounds if they offend him. From numerous instances of this dangerous influence, I select the following, which occurred on the Little Saskatchewan, or as it is sometimes called, Dauphin River. When ascending that stream, we came upon a large camp of Swampys, who were on their way to the Hudson's Bay Company's post at Fairford. Their usual wintering-place was at the Pike's Head near the mouth of Jack-fish River, an excellent fishing station on Lake Winnipeg, but they had abandoned the intention of wintering there, in consequence of a threat which had been conveyed to them from a noted conjuror styled "the Badger," of the Grand Rapid of the Saskatchewan, to the effect that "if the band ventured to winter at the Pike's Head, he would do something." This ambiguous threat was quite sufficient to deter them from



Medicine Rattle.

visiting their old haunts, and would probably be instrumental in producing much suffering, if not actual want, to many of the band.

There are many places on Lake Winnipeg and Manitobah which the Indians who hunt and live on the shores of those inland seas dare not visit. There is scarcely a cave or headland which has not some legend attached to it, familiar to all the wanderers on these coasts.

On the west side of Lake Winnipeg, in the long, dark, and gloomy chambers formed by fissures in the limestone, bad spirits are supposed to dwell, according to the belief of the Indians who hunt on the coast, and he would be a powerful charmer who could induce a heathen Indian to approach, much less enter, the abodes of these imaginary Manitous.

Near Limestone Cave Point, on Lake Winnipeg, are several of these supposed fairy dwellings. When an Indian approaches them in his canoe, he either lays an offering on the beach or gives them as wide a berth as possible.

Steep Rock Point, on Lake Manitobah, is also a noted dwelling-place for the "Little Men." Some of the traditions connected with these places are very absurd, and appear to have little meaning to civilized men; nevertheless, among the barbarous tribes of those regions, they are associated with their past history, or with the history of the race that preceded them. Manitobah Lake, a body of water of very imposing dimensions, having an area of 1,900 square miles, derives its name from one of these superstitions. I stayed for three days on Manitobah island, where a Manitou dwells, but although Indians passed and repassed, heard and answered our shots, yet they could not be persuaded to land. The only evidence of fairy presence which I met with, was the "fairy-like music" of the waves of Lake Manitobah, beating upon the hard limestone shingle on the beach, and producing a very beautiful and melancholy resemblance to distant church-bells. All night long this ringing musical sound was heard, and would, no doubt, in the active imagination of Indians, suggest the existence of those Manitou with which they people the air, the water, the forests, and the caves of the earth.

The able and zealous missionary at the Indian Settlement, Red River, the Rev. A. Cowley, has had sad experience of the gross superstitions which darken the intellect of the Ojibways of Lake Manitobah. In 1842 he proceeded to what appeared to be a promising station on the shores of this lake, where he had an opportunity of observing some remarkable instances of heathen faith in dreams and charms. Mr. Cowley writes: "One day I saw something hanging on a tree and went to look at it. It consisted of twenty small rods, peeled, and painted red and black, and fastened together on a plane, with cords of bark. A piece of tobacco was placed between the tenth and eleventh rods, and the whole was suspended perpendicularly from a branch of the tree. It belonged to the old chief, who told me that when he was a young man he lay down to dream, and that in his dream, the moon spoke to him, and told him to make this charm, and to renew it every new moon, that he might have a long life. He had regularly done so ever since, till the preceding summer, when he almost forgot it, and was taken so ill as to be near dying; but he remembered it, his friends did it for him, and he recovered." *

Sacrifices and offerings are of very frequent occurrence among the Indians of the Saskatchewan Valley. The customary offering consists of two, three, and sometimes five dogs. At the mouth of the Qu'appelle River, an

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* Quoted by S. Tucker, in "The Rainbow of the North."

Indian, in June 1858, set his net and caught a large fish of a kind different to any with which he was familiar; he immediately pronounced it to be a Manitou, and carefully restoring it to the water again, at once sacrificed five valuable dogs to appease the anger of the supposed fairy. On approaching Long Lake, an arm of the Qu'appelle River Valley, the Crees warned us not to visit the lake by night, as it was full of devils. They told me very extraordinary tales, which are too absurd to be worth relating, of the dimensions and power of these devils, and they appeared to live in awe and terror of them.

Like most heathen and barbarous races, Indians suffer much from their superstitious fears. When the weather is fine, and their tents are well supplied with provisions, they are an independent and joyous people. Full of frolic and fond of relating anecdotes, they laugh immoderately at any trifling joke or absurdity, and seem thoroughly to enjoy existence.

A ridiculous incident occurred in the tent belonging to the Cree chief, Mis-tick-oos, in which I played a more prominent part than I should have selected had any choice been offered me. I heard of this incident again hundreds of miles from the spot where it occurred, as we journeyed homewards from the Grand Forks.

It happened during a visit I paid to Mis-tick-oos (Vol. I. p. 362), after a long and tedious talk, which lasted nearly seven hours, relating to the object we had in view in visiting the country. Three of Mis-tick-oos' wives were visible, and with their children formed altogether a party of eighteen or twenty. I rose from a buffalo robe where I was seated by the side of Mis-tick-oos to examine some arrows which one of his sons was making, and when my curiosity was satisfied, I sat down on what I thought to be a bundle of buffalo robes, close to the young Indian.

I was not a little astonished to feel the robes slowly move and undulate beneath me, and before I could rise and look into the cause, I found myself projected into the middle of the tent among the embers, by means of some violent spasmodic action from beneath the supposed pile of robes. Mis-tick-oos and his three wives with the other inmates, shrieked with laughter, vociferating some words in Cree. Meanwhile, the buffalo robes were slowly thrown on one side, and, to my astonishment, were revealed the huge proportions of the chief's fourth, youngest and best wife. She shook a mass of hair from her head, and joined in the laughter at my discomfiture. Other Indians hearing the noise came in, and Mis-tick-oos, with tears in his eyes, told his friends how "the white stranger had sat upon his best wife, thinking she was a pile of robes, and how she tossed him into the middle of the tent like a buffalo bull pitching a colt."

During our stay with the Crees of the Sandy Hills on the South Branch, when passing the door of the tent belonging to the chief's eldest son, who was my companion at the time, I observed a young squaw leaning upon sticks, evidently in great trouble, and weeping bitterly. The moment she saw us she hobbled into the tent, with a low cry of pain, and closed the entrance. I asked the interpreter what this meant. After some conversation with her husband, he said that the woman was suffering from a beating he had given her for a violation of her faith during his absence in the spring on a war excursion. "I would have killed her," muttered the husband, "but I thought it a pity to kill two at once. She had her choice whether she would have her hair, her nose, or her ear cut off, or whether she would have a beating. She chose what she has got; but I would have killed her had I not known I should regret having killed both." It is needless to add that the woman soon expected to become a mother.

Smearing the skin with different coloured pigments is a universal custom among the wood and prairie Indians. Sometimes the operation is very tastefully performed. Warriors on the "war-path" often paint the figure of the hand over the mouth, as used in sounding the war-whoop; this is a distinctive sign that the Indian so decorated has been recently, or is still engaged in the pursuit of his enemies. Vermilion is the most coveted colour; the Ojibways particularly are very fond of decorating their faces with this brilliant pigment. The Plain Crees are partial to white, green, and blue, and not only paint the face, but also the chest and arms. They cut and gash the skin and flesh on the arms, sides, chest, and legs, as a token of grief for any deceased friend or relation. My friend Mis-tick-oos' body was dreadfully disfigured by scars from wounds made by himself in manifestation of his grief.

Ornamenting the skin of the arms and breast with the figures of birds, quadrupeds, or symbols of different kinds, is common among the Plain Crees. The operation is performed with a needle, a thorn, the point of a knife, or the edge of a flint. The surface of the skin is cut or penetrated with the instrument used, and the colour rubbed in, as in the process often adopted on a small scale by sailors. The effect is to produce a permanent representation of different objects on the skin, but it does not resemble the ridges and furrows produced by the tattooing process of the New Zealanders.

Nothing appears to contribute so largely to the comfort and enjoyment of Indians, whether of the woods or the prairies, as the pwahgăn of the Ojibway, the uspwägān of the Cree, or the pipe of the English.

When inhaling the fumes of tobacco, the bear-berry or the inner bark of the red willow, the Indian relinquishes himself to the narcotic influences of the "weed," a term by the way applied to the bear-berry, and to the dry and gravelly ridges where that pretty little creeping plant flourishes; the local names, "weed-ridge," "weed-hill," being not uncommon in Rupert's Land. It has been well said that "the tobacco pipe constitutes the peculiar and most characteristic symbol of America, intimately interwoven with the rites and superstitions and with the relics of ancient customs and historical traditions of the aborigines of the New World. If Europe borrowed from it the first knowledge of its prized narcotic, the gift was received unaccompanied by any of the sacred or peculiar virtues which the Red Indian still attaches to it as the symbol of hospitality and amicable intercourse, and Longfellow, accordingly, with no less poetic vigour than fitness, opens his "Song of Hiawatha," with the institution of the "Peace-pipe" by the Great Spirit, the Master of Life.*

Pipe No. 1 was presented to me by Tà-wâ-pit, an old Indian of Dauphin Lake. He had another in his pouch nearly completed, made from the soft shale which crops out on the Riding Mountain. I asked Tà-wâ-pit "what he would do for a smoke" until he had finished the new pipe? After the half-breed with me had made him understand my question, he rose to his feet, and walking to the edge of a swamp close by, cut three or four reeds, and joining some pieces together, after he had made a hole through the joints, he gently pushed one extremity in a slanting direction into the earth, which he had previously made firm by pressure with his foot; he then cut out a small hole in the clay above the extremity of the reed, and moulding it with his fingers, laughingly said, "Now give me tobacco, and I will show you how to smoke it." He filled the hole with a mixture of tobacco and the bear-berry, placed a live coal on the top, and stretching himself at full length on the ground, with his chin supported by both hands, he took the reed between his lips and enjoyed a long smoke.

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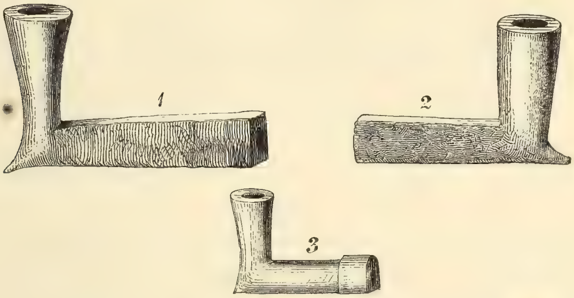
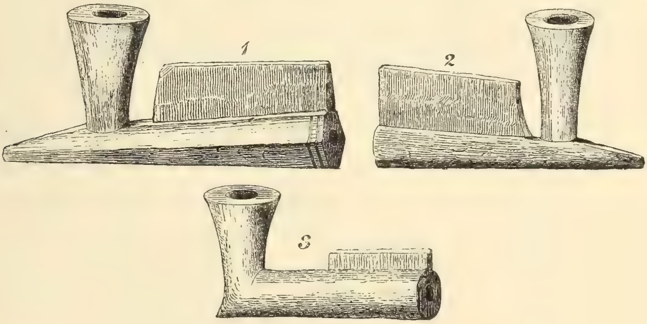
* "Narcotic Usages and Superstitions of the Old and New World," by Daniel Wilson, LL.D. Canadian Journal, new series, vol. ii.



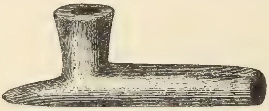
Tobacco Pipes of the Swampys of Lake Winnipeg.

Different tribes of Indians affect peculiar shapes and ornaments in the manufacture of their pipes. The Ojibways of Rainy Lake and those of the same nation living on Lake Winnipeg, have different patterns, but preserve a certain resemblance, which appears to be characteristic of this people.

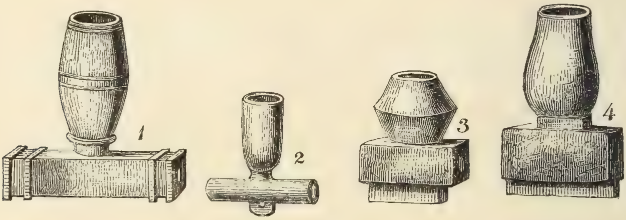


Tobacco Pipes of the Ojibways of Rainy Lake, &c.

The pipes manufactured by the Plain Crees and the Blackfeet are formed after the same model; those of the Sioux approach more to the form almost universally adopted by the Ojibways; while the beautiful and sometimes highly ornamented pipes of the Chipewyans resemble more the favourite models of the prairie tribes. These distinctions will be seen at a glance in the accompanying drawings, which are all reduced from pipes in my possession.



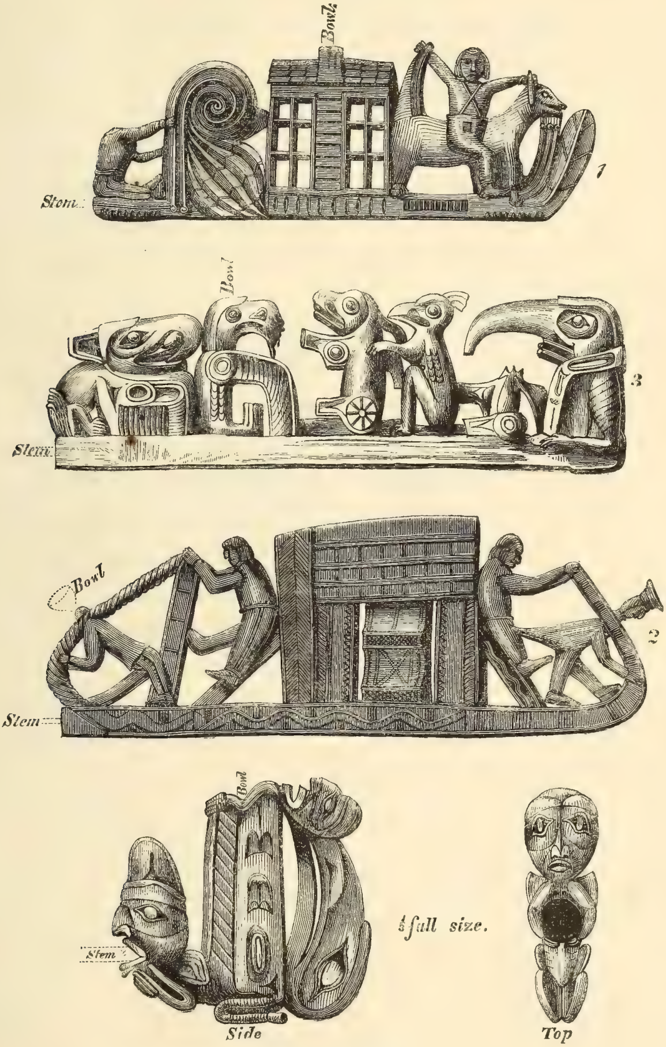
Sioux Pipe.



Chipewyan (1 and 2), Plain Cree (3), and Blackfoot (4) Pipes.

The elaborate and sometimes beautiful pipes of the Babeen Indians, while they exhibit a much higher degree of art than we should expect to find among such a savage race, are by no means illustrative of their superstitions or customs, and can be received as illustrations only of their imitative power and ingenious workmanship. The grotesque devices with which their pipes are ornamented can generally be traced to objects which they have seen since they became familiar with the traders belonging to the Hudson's Bay Company on the north-west coast.

The customary salutation among the Ojibways who have been brought in contact with the French Canadian voyageurs of the old North-West Company is, "boujou! boujou!" from bon jour. Among the Plain Crees, with whom the Scotch employés of the Hudson's Bay Company early established communication, the first address is generally "whacheer! whacheer!" *Anglice*, what cheer?



Babeen Pipes.

Shaking hands is customary both on meeting and parting. The usual preliminary to a council or a series of questions, is a smoke; and nothing smoothes the way to an affable arrangement in case of a difficulty so quickly as a proposal to argue the point and arrange matters over a pipe. A great point is gained if the traveler is able to present the chief of the party with a plug or canister of tobacco to replenish his pipe, and when he offers to return it, a courteous intimation that he may keep the remainder or hand it round to his young men, is often a very advantageous stroke of policy.

In order to understand the character and nature of wild prairie Indians, they must be seen in their tents when well supplied with provisions, and disposed to be cheerful and merry. In the prairies when on horseback, they are often quiet and watchful, always on the look out, and when even twenty or thirty are in a band, they generally manage to see a suspicious object in the distance at the same moment, so that a simultaneous note of exclamation is uttered by most or all of the party. In hunting the buffalo they are wild with excitement, but no scene or incident seems to have such a maddening effect upon them as when the buffalo are successfully driven into a pound.* Until the herd is brought in by the skilled hunters, the utmost silence is preserved around the fence of the pound: men, women, and children, with pent-up feelings, hold their robes so as to close every orifice through which the terrified animals might endeavour to escape. The herd once in the pound, a scene of diabolical butchery and excitement begins; men, women, and children climb on the fence, and shoot arrows or thrust spears at the bewildered buffalo, with shouts, screams, and yells horrible to hear. But when the young men, and even women jump into the arena amidst the dying and the dead, smear themselves with blood, thrust their arms up to the shoulders into the reeking bodies of their victims, the savage barbarity of the wild prairie Indian shows itself in its true colours. Not even a scalp dance over many fallen foes, affords such a terrible picture of degraded humanity as a large band of prairie Indians, some hundreds in number, during and after the slaughter of buffalo in the pound.

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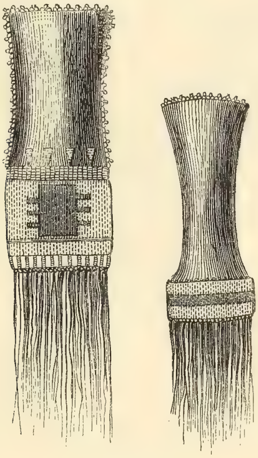
* The half-breeds call these enclosures "ponds."

The condition of the Indians of the Saskatchewan Valley at the present day is very different to what it was even half a century since. Not only have imported diseases greatly diminished their numbers, but game of different kinds has become so scarce that during some seasons starvation is no fiction. In the northern parts of Rupert's Land a great mortality took place in 1816, 1817, and 1818, from small-pox and measles. Vaccine inoculation was then introduced by the Hudson' Bay Company, and small-pox has been unknown in the country since.*



Cree Fire-bags.

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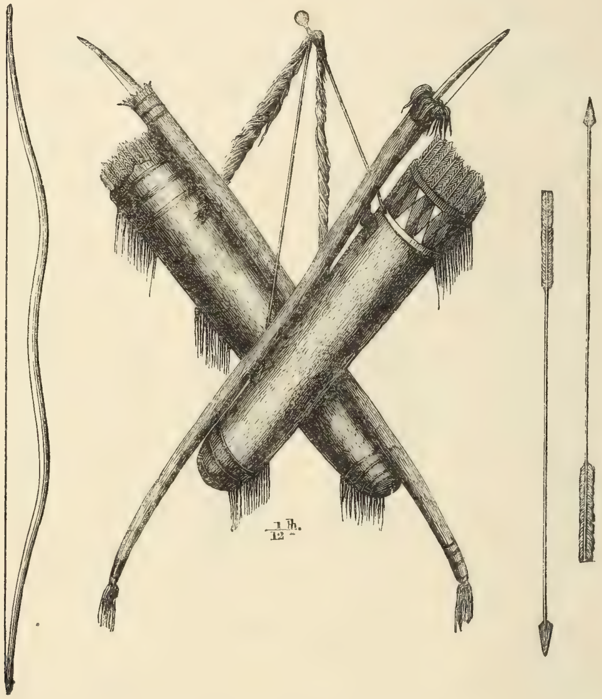
* Sir George Simpson. Blue Book on the affairs of the Hudson's Bay Company.

The Sioux south of the boundary are said to be all vaccinated.

In sickness prairie Indians are much depressed, and often seek consolation in the monotonous drum of the medicine man and his heathenish incantations; an infliction which the grossest and most debased superstition alone would tolerate; it is submitted to with confidence and hope, however, by men who are anxious and timid during the roll of thunder, invoking the Great Bird by whose flapping wings they suppose it to be produced, or crouching from the blink of his all-penetrating eye, which they allege is the lightning's flash.



Sioux Quiver, Bow, and Arrows.

CHAP. XXX.

INDIAN POPULATION OF BRITISH AMERICA.

Origin of Indian Races.—Kindred and Relationship.—Iroquois Customs.—Iroquois Institutions.—Iroquois League.—Indian Population of Rupert's Land.—Probably over-estimated.—Number of Indians frequenting particular Posts.—Prairie Indians.—Colonel Lefroy's Estimate.—The Sioux or Dakotah Indians.—Principal Bands.—Conjurors.—Months.—Language.—The Blackfeet.—Country occupied by the Blackfeet.—Blackfeet Tribes.—Indians near the Boundary Line.—Indians of British America.—Indians of the United States.—Early History of the Indians.—Mutability of Indian Nations.—The Hurons and Iroquois.—The Prairie Tribes.—The Remnant.

The origin of the aborigines on this continent still remains enveloped in thick darkness. Many of their manners, superstitions, and customs correspond to those of Orientals, and it is not improbable that modern ethnologists may be on the right track in their efforts to solve this deeply interesting question.

The ties of kindred and relationship are of a very complex character among the Ojibways; in more than one instance a singular exemplification of cross-relationship occurred during our voyage in 1858 on Lakes Winnipeg and Manitobah, which may serve to show the permanency of ancient customs and traditions among families now dwelling nearly a thousand miles west of the hunting-grounds of their ancestors.

Near the mouth of the Little Saskatchewan, we met an Indian family journeying in a small canoe towards the mouth of Red River. The family consisted of a young Indian, his wife, and two little children. The father was born on the shores of Lake Winnipeg, and had never traveled east of that lake. After a few words had passed between him and a half-breed Ojibway from Lake Superior (Wigwam), they shook hands and proclaimed themselves related to one another. Each belonged, as I was informed, to the tribe whose "*totem*" or insignia was the "Bear," and having by some means, which Wigwam could not or would not explain, ascertained this fact, they spoke to one another as brothers. A similar relationship was established between Wigwam and another Ojibway on Moss River, solely, as he assured me, because he and his newly found friend belonged to a tribe whose "*totem*" was the "Bear." The Cree half-breeds told me that in their communication with the Ojibways of Lake Winnipeg, and farther to the west, this recognition of relationship not unfrequently took place between individuals who met for the first time, and who were born and lived in districts far apart. In connection with this singular kind of consanguinity and the bearing it may possibly have upon the origin of the Indian races, I append the following extract from an ethnological paper, read at the Montreal Meeting of the American Association for the Advancement of Science*:—

> "It has occurred to me, after a careful examination of the system of consanguinity and descent of the Iroquois, that we may yet be able, by means of it, to solve the question whether our Indian races are of Asiatic origin. Language changes its vocabulary not only, but also modifies its grammatical structure in the progress of ages; thus eluding the inquiries which philologists have pressed it to answer; but a system of consanguinity once matured and brought into working operation is, in the nature of things, more unchangeable than language;—not in the names employed as a vocabulary of relationship, but in the ideas which underlie the system itself.

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* By Lewis H. Morgan, Esq., of Rochester, N. Y.

The Indo-European nations have one system, identical in its principal features, with an antiquity of thirty-five centuries, as a fact of actual record. That of the Iroquois is original, clearly defined, and the reverse of the former. It is, at least, to be presumed that it has an antiquity coeval with the race. That of the Chippewa is the same as the Iroquois, with slight modifications; thus establishing the fact of its existence in two of the principal generic stocks. Besides this, there are traces of the same system among the Aztecs, Mohaves, Creeks, Dacotahs, Delawares, Winnebagoes, and other races, all tending to show that the system has been, and now is, universal upon this continent. Should this last fact be established, the antiquity of the system as coeval with the Indian race upon the continent, will also become established. Upon the basis of these two facts, and assuming that these races are of Asiatic origin, we may predict the existence of the same system in Asia, at the present moment, among the descendants of their common ancestors, if any remain.

"A brief explanation of the principal features of the system of the Iroquois is annexed, which will assist in working out every other, particularly if they are founded upon the same ideas.

"The institutions of the Iroquois were founded upon the family relationships; in fact, their celebrated league was but an elaboration of these relationships into a complex system of civil polity. At the base of this were their laws of descent. They were unlike both the civil and the canon laws, but yet were original and well defined. The chief differences were two: first descent among the Iroquois followed the female line, or passed through the mother; while in each of the former systems it follows the male, or passes through the father. In the second place the collateral lines, with the Iroquois, were finally brought into or merged in the lineal; while, in the other cases, every remove from the common ancestor separated the collateral lines from the lineal, until after a few generations actual relationship ceased among collaterals.

"To bring out distinctly this code of descent, it will be necessary to give a brief explanation of the division of the Iroquois into tribes, the union of the several tribes into one nation, and of the several nations into one league. Without a reference to their civil organization, it would be impossible to present it in an understandable form.

"In each of the five nations who composed the original league there were eight tribes, named: Wolf, Bear, Beaver, and Turtle; Deer, Snipe, Heron, and Hawk. The Onondaga nation, therefore, was a counterpart of the Cayuga, each having the same number of tribes, and of the same name; so also, interchangeably, of the Oneida, the Mohawk, and the Seneca nations. In effect, the Wolf tribe was divided into five parts, and one-fifth part of it placed in each of the five nations. The remaining tribes were subjected to the same division and distribution. Between the individual members of the Wolf or other tribe thus divided, or, in other words, between the separated parts of each tribe, there existed the tie of consanguinity. The

Mohawk of the Turtle tribe recognized the Seneca of the Turtle tribe as a relative, and between them existed the bond of kindred blood. In like manner the Oneida of the Hawk tribe received the Onondaga or the Cayuga of the same tribe as a relative, not in an ideal or conventional sense, but as actually connected with him by the ties of consanguinity. Herein we discover an element of union between the five nations, of remarkable vitality and power. A cross-relationship existed between the several tribes of each nation and the tribes of corresponding name in each of the other nations, which bound them together in the league with indissoluble bonds. If either of the nations had wished to cast off the alliance, it would have broken this eight-fold bond of consanguinity. Had the nations fallen into collision with each other, it would have brought Hawk tribe against Hawk tribe — in a word, brother against brother. The history of the Iroquois exhibits the wisdom of these organic provisions; for, during the long period through which the league subsisted, they never fell into anarchy, nor even approximated to a dissolution from internal disorders.

" At no time in the history of the Iroquois could a man marry a woman o his own tribe, even in another nation. All the members of a tribe were within the prohibited degrees of consanguinity; and to this day, among the descendants of the Iroquois, this law is religiously observed. Husband and wife, therefore, were in every case of different tribes. The children were of the tribe of the mother. Here, then, we discover, one of the central ideas of their laws of descent: to place the father and mother in different tribes, and to assign the children to the tribe of the mother. Several important results followed, of which the most remarkable was, the perpetual disinheritance of the male line. As all titles, as well as property, descended in the female line, and were hereditary in the tribe, the son could never succeed to his father's title of sachem, nor inherit even his tomahawk.

"A tribe of the Iroquois, it thus appears, was not, like the Grecian and Roman tribes, a circle or group of families, for two tribes were necessarily represented in every family; neither, like the Jewish, was it constituted of the lineal descendants of a common father; on the contrary, it involved the idea of descent from a common mother; nor has it any resemblance to the Scottish clan, or to the canton of the Switzer. It approaches, however, nearer to the Jewish. Denying geographical boundaries, a tribe of the Iroquois was composed of a part of a multitude of families, as wide spread as the territories of the race, but yet united together by a common tribal bond. The mother, her children, and the descendants of her daughters, in the female line, would, in perpetuity, be linked with the fortunes of her own tribe; while the father, his brothers and sisters, and the descendants in the female line of his sisters would be united to another tribe, and held by its affinities. No circumstances could work a translation from one tribe to another, or even suspend the nationality of the individual. If a Cayuga woman of the Hawk tribe married a Seneca, her children were of the Hawk tribe and Cayugas, and her descendants in the female line, to the latest posterity, continued to be Cayugas and of the Hawk tribe, although they resided with the Senecas, and by successive intermarriage with them had lost nearly every particle of Cayuga blood. Neither could intermarriage with one of a foreign nation confer the Iroquois nationality upon the wife or children of the marriage, and the same *vice versâ.* If a Mohawk married a Delaware woman, she and her children were not only Delaware still, but ever continued aliens, unless naturalized as Mohawks, with the forms and ceremonies prescribed in case of adoption."

The difficulty of obtaining reliable information respecting the Indian population has been acknowledged by all who have given attention to this subject. I am convinced that the number of Indians inhabiting Rupert's Land has been considerably overrated. The estimates published in the Appendix to the Report from the Select Committee on the Hudson's Bay Company furnish the following result:—

Thickwood Indians on the east side of the Rocky Mountains .	35,000
The Plain Tribes (Blackfeet, &c.)	25,000
	60,000

The Indian population of Rupert's Land is estimated at 42,870. Over the plain or prairie tribes the Hudson's Bay Company profess to have no control, and they are returned as numbering 25,000 souls. Excellent authorities, noticed in the following pages, do not assign more than half that number to the most numerous tribes of Prairie Indians who hunt on the Saskatchewan and Missouri and their tributaries.

The Plain Crees and Thickwood Indians are under the control of the Company, but I think that their numbers are also over estimated, and the grounds on which this opinion is advanced are stated in the following paragraphs.

The basis of the census for the Thickwood Indians and the Plain Crees is the number frequenting the establishments of the Hudson's Bay Company in 1856, and the following enumeration at certain Posts chiefly visited by the Plain Crees is given:—

Post.	No. of Indians frequenting it.
Fort Ellice	500
Qu'appelle Lakes	250
Touchwood Hills	300
Fort à la Corne	300
	1,350 Indians.

Upon perusal of the foregoing table the reader would infer that 1,350 Indians visited the Posts named. It happens, however, that many Indians trade with two or more Posts, although every effort is made to limit them to one particular station. Their names appear on the books at different establishments, and in the enumeration of the Indians inhabiting certain districts, some of them are counted twice and even three times. I ascertained beyond doubt, that this practice existed to an extent which would affect the census in a marked degree. The custom of giving credit to Indians encourages this system, while a natural desire to attach additional hunters to a Post on the part of the traders, induces less caution than would otherwise be exercised. As the result of very careful inquiries wherever opportunities offered, of obtaining exact information, I am inclined to think that the estimate of 42,870 is about one-fourth too high.

The estimated number of Indians frequenting particular establishments of the Hudson's Bay Company referred to in these volumes, during 1856, is given in the following table:—

Locality.	Number.
Fort William	350
Pigeon River	50
Fort Frances	1,500
Rat Portage	500
Lac de Bois Blanc	200

Locality.	Number.
Shoal Lake	200
White Dog	100
Fort Alexander	300
Lac de Bonnet	50
Fort à la Corne	300
Cumberland House	250
The Pas	300
Fort Pelly	800
Fort Ellice	500
Qu'appelle Lakes	250
Shoal River	150
Touchwood Hills	300
Egg Lake	200
Manitobah House	200

On the North Branch of the Saskatchewan, where the Prairie Indians assemble, the following enumeration is given in the Blue Book :—

Locality.	No. of Indians.
Edmonton	7,500
Carlton	5,000
Fort Pitt	7,000
Rocky Mountain House	6,000

This census may approximate to the actual number of Indians visiting a particular Post, yet there is strong reason to suppose that the same individuals are to a large extent enumerated twice if not thrice.

The Plain or Prairie Indians belong to the following principal tribes :—

Blackfeet,
Bloodies,
Piegans,
Fall Indians, or Gros Ventres,
Crees,
Assinniboines,
Sioux.

The Wood Indians of the Saskatchewan Valley belong to the great family of Crees and Ojibways. The Sioux, Blackfeet, Bloodies, and Piegans are Dakotahs.

Mr. Harriet, a chief-factor of the Hudson's Bay Company, who had passed his life among the Blackfeet, estimated the six or seven tribes going by that general name as mustering 1,600 to 1,700 tents, at eight per tent, 13,000.*

Mr. Rowand, one of the oldest resident traders, estimates the Blackfeet tribes as follows:—

Blackfeet proper		300
Piegans		400
Bloods		250
Gros Ventres, or Fall Indians		400
Circes		45
Cotones Small Robes	Mountain Tribes	250
At 8 persons per tent, 13,100.		1,645 tents.

The Assinniboines are divided into Strongwood and Plain Assinniboines, or Stonys.

Mr. Harriet, in 1842, estimated the

Strongwood Assinniboines	at 80 tents		= 640
Mr. Rowand, the Plain Assinniboines	„ 300 „		= 2,400
	380 tents		= 3,020
The Strongwood Crees about Edmonton			
Mr. Rowand estimated at	400 tents,	at 10 per tent	= 4,000
Crees of the Plains	200 „	„ „	= 2,000
			6,000

Colonel Lefroy† states that the aggregate of the tribes inhabiting the plains on British territory was estimated in 1843 at not more than 23,400. Since that period they have diminished in numbers, and some of the Blackfeet bands have stationed themselves permanently on the Missouri. In succeeding pages, recent estimates of the Blackfeet tribes, and the limits of their hunting-grounds are given.

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* Colonel Lefroy.

† "On the probable number of the native Indian population of British America," by Captain (now Colonel) J. H. Lefroy, R.A. Canadian Journal, vol. i. Old Series.

The Sioux and the Blackfeet being the most warlike tribes of the north-west, and retaining their ancient customs to the fullest extent, the following brief notices of these formidable native races are introduced. The Plain and Wood Crees and the Ojibways are almost altogether amenable to the influence of the Hudson's Bay Company, and are in fact the hunters upon whom they rely for a considerable proportion of their furs, robes, skins, and provisions.

THE SIOUX OR DAKOTAH INDIANS.

The nation of the Sioux Indians or Dakotahs * is composed of seven principal bands. Their aggregate number probably does not exceed twenty-five thousand. Their hunting-grounds extend from the Mississippi River to the Black Hills in Nebraska, and from the mouth of the Big Sioux River to Devil's Lake. Although the Sioux have no dealings with the half-breeds of Red River, or with the Hudson's Bay Company, yet they often cross the 49th parallel in pursuit of the buffalo, and more frequently in search of a scalp from their hereditary enemies, the Ojibways and Crees. As the most dreaded invaders of the prairies north of the boundary line, this powerful nation deserves a special notice.

The name Dakotah signifies the "Allied," and they speak of themselves as the "Oceti sakowin" or "Seven Council Fires." The following enumeration of the principal bands which compose the nation, by the members of the American Dakotah Mission, will be found at length in the Grammar and Dictionary prepared with so much care, labour, and zeal, under the editorial management of

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* See Introduction to a Grammar and Dictionary of the Dakotah Language, published by the Smithsonian Institution.

the Rev. S. R. Riggs, A. M., Missionary of the American Board of Commissioners for Foreign Missions.

1. The Mdewakantonwans, *Village of the Spirit Lake.* The name is derived from Mdewakan (Spirit or Sacred Lake), Mille Lacs (Minnesota), in the country now claimed by the Ojibways. This band numbers about two thousand.

2. The Wahpekutes, *Leaf Shooters*, five hundred.

3. The Wahpetonwans, *Village in the Leaves*, twelve hundred.

4. The Sisitonwans, *Village of the Marsh*, two thousand five hundred. Their hunting-ground is about the Coteau des Prairies, and they subsist on the buffalo.

5. The Ihanktonwanna, *the End Village Band*, four thousand. Their country is on the north-east of the Missouri, as far as Devil's Lake. These are the great enemies of the Red River half-breeds.

6. The Ihanktonwans, *the Village at the End*, two thousand four hundred. Their country is west of the Missouri. They are frequently termed Yanctons.

7. The Titonwans, *the Village of the Prairie*, twelve thousand five hundred. Their hunting-ground is west of the Missouri. They are divided into seven bands: the Sicaugu, *Burnt-Thighs;* the Itazipco, *Bow-pith;* the Sihasapa, *Blackfeet;* the Minikanye wozupi, *Those who plant by the water;* the Oohenoupa, *Two-boilings;* and the Oglala and Hunkpapa.

The conjurors believe that their dreams are revelations from the Spirit World, and they aver that their prophetic visions are the mental revival of occurrences in a former state of existence. Years with them are enumerated by winters; a distance is estimated by the number of nights a man will sleep on the way. The Ojibways have the same method of expressing time and distance. They divide the year into moons, but weeks are unknown to them. The Dakotahs of the valley of the Minnesota have the following months in the year[*]: —

1. Wi-tehi, January; the hard moon.
2. Wicata-wi, February; the racoon moon.
3. Istawicayazan-wi, March; the sore (eye) moon.
4. Magaokada-wi, April; the moon in which the geese lay eggs.
5. Wozupi-wi, May; the planting moon.
6. Wazustecasa-wi, June; the moon when the strawberries are red.
7. Canpasapa-wi, July; the moon when the choke cherries are ripe.
8. Wasutou-wi, August; the harvest moon.
9. Psinhnaketu-wi, September; the moon when rice is laid up to dry.
10. Wi-wazupi, October; the drying rice moon.
11. Takiyuha-wi, November; the deer rutting moon.
12. Tahecapsun-wi, December; the moon when the deer shed their horns.

The Dakotahs have a common and a sacred language. The conjuror, the war prophet, and the dreamer employ a language in which words are borrowed from other Indian tongues and dialects; they make much use of descriptive expressions, and use words apart from the ordinary signification. The Ojibways abbreviate their sentences and employ many elliptical forms of expression, so much so that half-breeds, quite familiar with the colloquial language, fail to comprehend a medicine man when in the full flow of excited oratory.

The American missionaries, in their admirable written Dakotah language, employ five vowels, and twenty-four consonants, among which are two *c*'s, two *g*'s, two *h*'s, two *k*'s, two *n*'s, two *s*'s, two *t*'s, and two *z*'s. The repetition of the same letter is used to denote a guttural, an aspirate, an emphatic, or a nasal sound. Thus, *c* is both an aspirate and an emphatic letter; *g* like the English *g* and guttural; *h* like the English *h* and guttural; *k* as in English and emphatic; *n* as in English and nasal; *p* as in English and emphatic; *s* as in English and aspirate;

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[*] See Grammar and Dictionary before referred to.

t as in English and emphatic; *z* as in English and aspirate.

All syllables are enunciated plainly and fully, but accentuation often determines the meaning of a word. There are three numbers: singular, dual, and plural; the dual including the person speaking and the person spoken to. The proper names of the Dakotahs are words, simple and compounded, which are in common use in the language. The son of a chief when he succeeds his father usually takes the name of his father or grandfather. As with the Ojibways and Swampys, their proper names consist of a single noun or a noun and adjective. The Ojibways have, however, distinct family or "*totem*" names which they employ when speaking of their ancestors; as I am of the family of the Bear, the Eagle, the Thunder-cloud, &c. The Dakotahs have no surnames, the children of a family have particular names which belong to them in the order of their birth up to the fifth child. In counting they use their fingers, bending them as they enumerate until they reach ten. They then bend down a little finger to record one ten and begin again; when the second ten is counted they put down a second finger, and so on.

Dakotah verbs have only two forms of tense, the indefinite and the future; the other tenses are expressed by the help of adverbs, and the context. Words in a sentence are thus placed, first the noun, second the adjective, third the verb, thus:—

Ateunyanpi mahpiya ekta nanke chin
Father-we-have heaven in thou-art the;
Nichaze kin wakandapi kte;
Thy-name the holy-regarded shall;
Nitokichonze kin u kte;
Thy-kingdom the come shall.*

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* See a Grammar and Dictionary of the Dakotah Language, published by the Smithsonian Institution.

THE BLACKFEET.

Mr. James Doty, who resided for many years in the country of the Blackfeet, and who is acquainted with a large portion of that nation, gave the following boundaries of their country and estimate of the numbers of the people to Governor Stevens in 1853.* The country in which they reside and hunt is bounded as follows: "By a line beginning on the north, where the 50th parallel crosses the Rocky Mountains, thence east on said parallel to the 106th meridian, thence south to the headwaters of the Milk River, down said river to the Missouri, up the Missouri to the mouth of the Judith, thence up the Judith to its source in the Rocky Mountains, and north along their base to the place of beginning."

The country between the Missouri and the headwaters of the Yellowstone is unoccupied. It is the war road of the Blackfeet to and from the Crows, Flatheads, and Snakes. It may also be considered as a transient hunting-ground of the Flatheads, who hunt buffalo there for a time in the fall.

The Blackfeet nation is divided into four distinct tribes or bands, whose names, numbers, and localities † are as follows: —

	Lodges.	Population.	Warriors.
The Blackfeet . . .	250	1750	625
The Blood ‡ . . .	350	2450	875
The Piegans . . .	350	2450	875
The Gros Ventres . .	360	2520	900
Total . . .	1310	9170	3275

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* Explorations and Surveys for a Railroad Route from the Mississippi to the Pacific, p. 443.

† The country occupied by these tribes is evidently more extensive than supposed by Mr. Doty; their permanent lodges are found far beyond the limits given in the text.

‡ Called by the half-breeds "Bloodies."

The Bloods and Blackfeet occupy the country between Milk and Marias Rivers, to the 50th parallel of latitude.

The Piegans occupy the country between the Milk and Marias Rivers, and between the Teton and the Missouri.

The Gros Ventres occupy the country bordering upon Milk River from its mouth to the territory of the Piegans. The Bloods, Piegans, and Blackfeet speak the same language, the Gros Ventres the Arapahoe language; they were adopted by the Blackfeet about thirty years since, having seceded from their own nation. On the Upper Missouri, near the great bend, the Gros Ventres have a large village of mud houses. Some of the lodges are capable of supporting 100 persons; one part is appropriated to their horses, dogs, cattle, and chickens, another to their sleeping apartments; the lodges are built entirely by women. The Gros Ventres formerly hunted on the Assinniboine. Mr. J. M. Stanley, the artist of Governor Stevens' Exploration, states that the Blackfeet proper are divided into three distinct bands: the Blood band, 400 lodges; the Piegan band, 430 lodges; and the Blackfeet band, 500 lodges, averaging ten to a lodge, and amounting in all to 13,300 souls. The Piegans and Bloods hunt, trade, and winter on American soil, while the Blackfeet extend their hunt as far north as the Saskatchewan, and trade as frequently with the British as with the American Posts.*

The following census of the Indian tribes of the United States, inhabiting the states and territories adjoining the 49th parallel, is abstracted from the statistics of the tribes as reported to the Bureau of Indian Affairs †: —

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* Explorations and Surveys for a Railroad to the Pacific, p. 449.

† See the History, Condition, and Prospects of the Indian tribes of the United States, by H. R. Schoolcraft, LL.D.

Name of tribe.	Numbers.	
Assinniboine	8900	Extending from the Missouri into Rupert's Land.
Blackfeet	9530	Nebraska.
Bloods	1612	Upper Missouri.
Crees	800	Upper Missouri.
Sioux (Ihanktonwanna)	4000	Dakotah territory.
Gros Ventres	2500	Between the Missouri and the Saskatchewan.

The subjoined enumeration of Indian tribes inhabiting British North America, is from a paper "On the probable number of the Native Indian Population of British America," by Colonel Lefroy, referred to on page 152 :—

Chipewyan tribes—namely: Chipewyans proper, Dogribs, Hare or Slave Indians, Yellow Knives, Beaver Indians, Da-ha-dumies and Carriers	7,575
Northern Indians of the *Kutchin* stock	6,082
Indians of the Plains (Blackfeet, Assinniboines, &c.)	23,400
Chipeways (Ojibways) and Crees, exclusive of the above	8,675
Indians of the Seaboard and Islands of the Pacific	63,840
Indians of New Caledonia—Interior	2,000
Indians of Canada	13,000
	124,518

The number of Indians frequenting the establishments of the Hudson's Bay Company, in 1856, are thus classified in the Blue Book * : —

Thickwood Indians on the east side of the Rocky Mountains	35,000
The Plain Tribes (Blackfeet, &c.)	25,000
The Esquimaux	4,000
Indians settled in Canada	3,000
Indians in British Oregon and on the north-west coast	80,000
Total Indians	147,000

The census of the Indian tribes of the United States with whom intercourse was kept up by agents in the year

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* Report from the Select Committee on the Hudson's Bay Company.

1855 is stated in the Annual Report of the Indian Bureau of that year to include 314,622 souls.

An approximation to the total Indian population of the United States and British America will be as follows: —

Indians of the United States	314,622
Indians of British America (Colonel Lefroy)	124,518
Total	439,140

Or,

Indians of the United States	314,622
Indians of British America, according to the census of the Hudson's Bay Company	147,000
Total	461,622

The records of the early history of the Indians who formerly occupied Canada and the northern States of the Union prove that their numbers, during the first half of the seventeenth century, must have at least quadrupled the entire aboriginal population now occupying the vast territories under the control of the Hudson's Bay Company.

The extraordinary mutability of nations in the savage state, and the rapidity with which one race supplants another over large areas, is thus noticed by a recent writer on the early discoveries of the French in North America *: —"When Cartier arrived in the St. Lawrence, he described large and permanent Indian villages at Stadacona and Hochelaga; but little more than half a century afterwards, when Champlain visited the same localities, he apparently found few Indians about Quebec, and none permanently settled at Montreal. There may have been some exaggeration in Cartier's account, but the main fact remains, and it may probably be accounted for by

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* "On the Early Discoveries of the French in North America," by John Langton, M.A., Auditor of Public Accounts, Canada. A paper read before the Canadian Institute, and published in the "Canadian Journal," New Series, No. 12.

the increasing power of the Iroquois, which made those places dangerous abodes, and compelled the tribes which formerly occupied them, to retreat into the interior. Again, the country north of Lake Ontario is described by Champlain as affording signs of having been formerly extensively cultivated and thickly inhabited, but in his day it was entirely deserted, and only used as a hunting ground by the neighbouring tribes. But the country of the Ottawa, and across to the northern shore of Lake Huron, as also the Western Peninsula, is described as full of Hurons, and of Algonquin, Ottawa, Nipissing, and other allied tribes. Amongst the Hurons alone, in the limited area between Matchedash Bay and Lake Simcoe, he reckons eighteen walled villages, numbering 2,000 fighting men, and Sagard puts the whole population down at 30,000 or 40,000 souls.* Yet, within thirty years from that time this region was also a desert, and the remnants of the former inhabitants had retreated to the Northern Lakes, and as far west as the Sioux. The Hurons indeed were almost exterminated, and the paltry remnant which had not been either destroyed or incorporated with other tribes, were collected and brought down to Quebec, where their descendants still occupy the village of Lorette. All the tribes of the Western Peninsula, and the Eries on the south shore of that lake, seem also to have been utterly exterminated, as well as the greater part of the Illinois, and other western tribes; and the Iroquois were dominant over all Upper Canada, and all the northern part of New York and Ohio. All this occurred without the intervention of the white man; and there has been no disappearance of a savage race since, from the diseases and vices which civilization brings in its train, which has surpassed, even if it has equalled in completeness and rapidity, the desolation which the conquering Iroquois spread around them. They, too, have now nearly vanished from the scene of their former power under other influences, and may soon, like the Eries and Hurons, be remembered only by a name; but when we find such extraordinary vicissitudes occurring during the brief space, of which we have any certain record, we cease to be so much surprised at the total disappearance of the mound builders and other prehistoric races."

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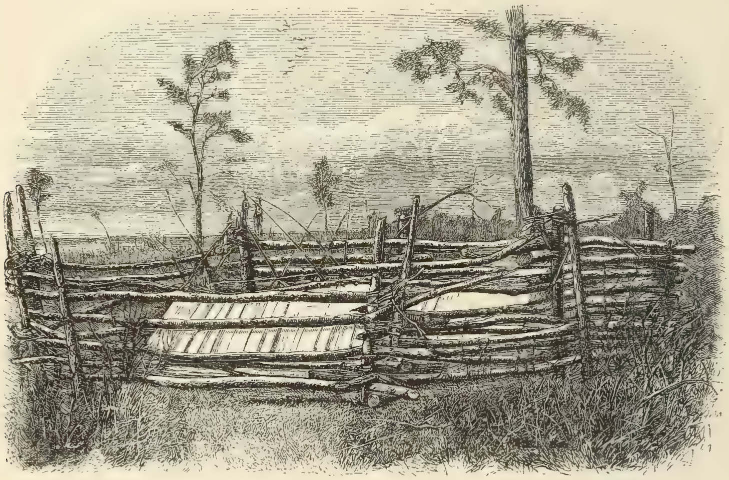
* It would not appear that this estimate can have been very greatly exaggerated, from the account given of the missionary establishments. They numbered in their most flourishing period, about the year 1645, forty-two missionaries besides their attendants. Of these two or three only remained at the principal station of Ste. Marie, at the mouth of the Wye, five other villages were called residences, where one or two missionaries remained permanently, and the rest moved from village to village often having as many as ten under their charge. As several of these villages are mentioned as containing from 100 to 200 cabins, and four to five families residing in each, the whole population cannot have fallen far short of 30,000.

The Mandans and Assinniboines who hunt on both American and British soil, and who are essentially prairie Indians, were estimated in 1783 to be capable of sending into the field 25,000 and 40,000 fighting men respectively. In 1786 the small-pox, coming north from the Mexican provinces, almost depopulated the country. In 1838 the same disease swept off at least one half of the prairie tribes. Five-and-twenty years ago, before this epidemic, aided by constant wars, had reduced the Plain Crees to one-sixth or eighth of their former numbers, Fort Ellice was often the scene of exciting Indian display. The officer in charge in July 1858, remembers the time when the entire tribe who now hunt on the Qu'appelle and South Branch would approach the Fort to receive their supplies, preceded by 800 mounted warriors, singing their war songs. Twenty-five years ago the tribe numbered 4000, in 500 tents; at the present day they do not exceed 120 tents, which represent a population of 960 or 1000 souls.

As stated in a preceding chapter, small-pox and measles produced a great mortality among the Wood Indians north of the Saskatchewan in 1816, 1817, and 1818. The ravages of this scourge began to tell in a fearful manner upon the native races in the valley of the St. Lawrence as early as the latter part of the seventeenth century. Charlevoix relates in 1670 that there were rarely less than 1200 Indians to be seen encamped at Tadousac, the entrepôt of the fur trade at that period during the trading season. The small-pox put an end to the trade by almost annihilating the Indians. Some tribes were quite exterminated, others amalgamated with surviving tribes, or carried their furs to the English Fort on Hudson's Bay.

When the Iroquois, who formerly occupied permanent villages on the south shore of Lake Ontario and the south bank of the St. Lawrence, were first known to Europeans, they alone were estimated by La Hontan at 70,000 souls. The numbers of the Indian population of British North America, on the east side of the Rocky Mountains, amounted to 67,000 in 1856, according to the Hudson's Bay Company. During that year the small-pox again visited the plain tribes, coming up the Missouri River, and destroying fully 3000 from among those who hunt on the Upper Missouri and between both branches of the Saskatchewan. In 1857 and 1858 it still lingered near the foot of the Rocky Mountains, and despair was stamped on the faces of the unhappy Mandans who were visited by Lieut. Warren soon after the scourge appeared amongst them. Wars, disease, and starvation have reduced to at least one-twentieth part of its former numbers an aboriginal population which two centuries ago occupied this vast area. How long will the remnant be preserved to minister to the cupidity of the white race who now rule and sustain them only so far as they are subservient to the objects of the fur trade?

Before the dispersion of the Hurons, about the year 1650, the customs observed by that people relative to the dead were as follows. Under the impression that the spirit, notwithstanding its separation from the body, did not immediately take its departure, the women were accustomed to frequent the grave of the deceased with tears, moans, and other outward signs of grief. The corpse was placed in a burying-ground called by the Hurons Oi-go-sa-yé. If the death had been natural, each corpse was encased separately in birch bark and elevated on four poles. They remained there until the celebration of the "Feast of the Dead," which took place every eight or ten years. At this period the inhabitants of a village taking down each bier in their Oi-go-sa-yé, carefully removed the dried flesh from the bones and wrapped the skeleton in furs and skins. The bones of the dead having been thus



Indian Graves covered with Split Sticks.

gathered from a wide extent of country * were placed with much solemnity in a large excavation richly decorated with furs. Valuables of different kinds were deposited with the remains, under the belief that they would be required by those to whom they belonged in another world or state of existence.

When the death has been violent or unnatural, the corpse was burned or buried immediately; and should a Huron have been frozen to death, the corpse would be carefully dissected, and the skeleton buried, never to be exhumed. The Hurons believed that the spirits of those who died in war, or suffered a violent death in any other way, enjoyed no communion in a future life with those who died in the ordinary course of nature.†

An ancient ossuary of the Hurons was opened near Penetanguishene in 1846. Its appearance externally was that of a mound about twenty-eight feet in diameter, covered with large trees which had grown upon it after its construction. An immense shroud of beaver skin enveloped the sacred deposit. Twenty-six copper kettles, hatchets, marine shells, bracelets or belts of wampum, &c., were placed near to the bones.

The Jesuit Missionary, P. de Brebeaf, who assisted at one of the "Feasts of the Dead" at the village of Ossossane before the dispersion of the Hurons, relates that the ceremony took place in the presence of 2000 Indians, who offered 1200 presents at the common tomb in testimony of their grief. The people belonging to five large villages deposited the bones of their dead in a gigantic shroud, composed of forty-eight robes, each robe being made of ten beaver skins. After being carefully wrapped in this rich shroud, they were placed between moss and

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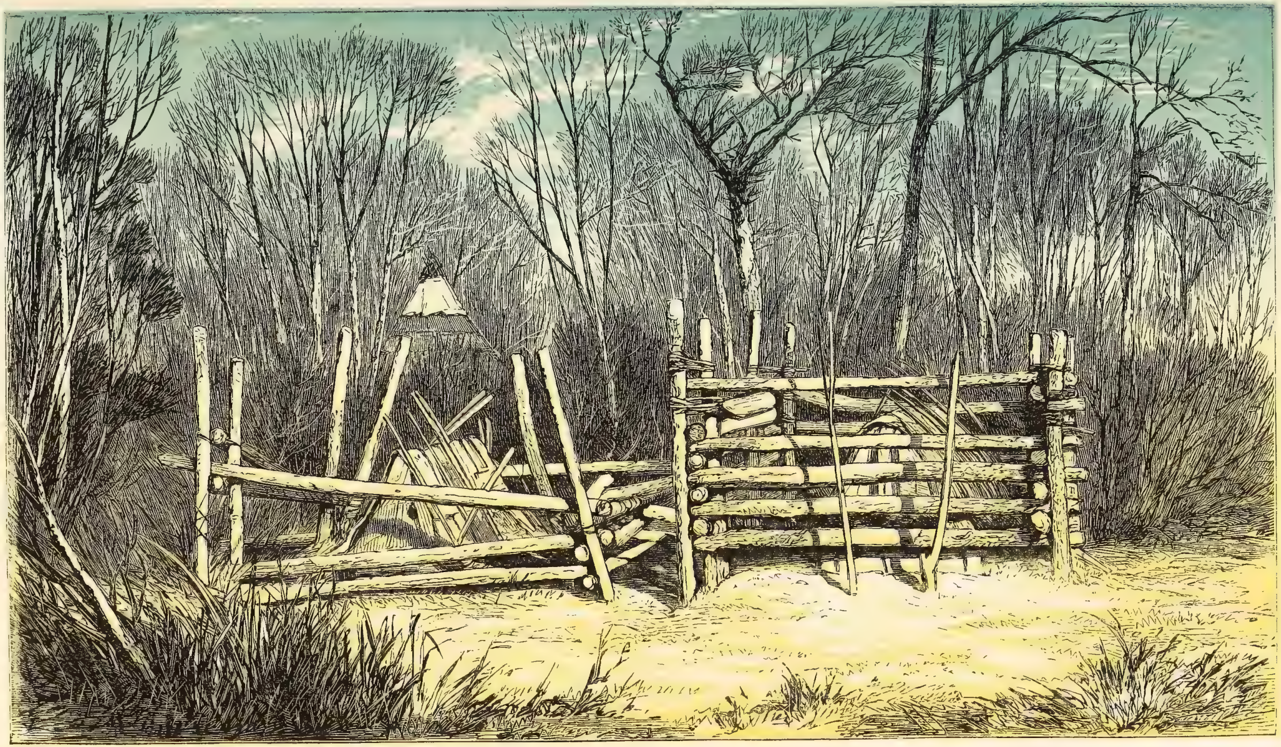
* Compare the description of ossuaries in Western Canada, Vol. I. p. 90.

† Relations Abrégées.

bark. A wall of stones was built round this vast ossuary to preserve it from profanation. Before covering the bones with earth, a few grains of Indian corn were thrown by the women upon the sacred relics.

According to the superstitious belief of the Hurons the souls of the dead remain near the bodies until the "Feast of the Dead;" after which ceremony they become free, and can at once depart for the Land of Spirits, which they believe to be situated in the regions of the setting sun.*

* Relations Abrégées.



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INDIAN GRAVES.

CHAP. XXXI.

INDIAN TITLE TO RED RIVER.

Indian Title in Canada.—Importance of the Question in Rupert's Land.—Cost of Indian Wars to the United States' Government.—Advance of Settlements towards the West.—Probability of a War with the Sioux.—Indian Races occupying the Country available for present Settlement in Rupert's Land.—Restlessness of these People.—The Right Hon. E. Ellice, M.P., on Indian Title in Canada.—Proclamation of 1763.—Opinion of the Canadian Commissioners on Indian Affairs with Respect to Indian Title in Canada.—Title to Red River.—Grant to Lord Selkirk.—Treaty between Lord Selkirk and the Crees and Saulteaux of Red River.—Peguis.—His Letter to the Aborigines' Protection Society.—His Address in 1859 to the "Great House."—M. MacDermott's Statement.—Meeting of the Half-Breeds of Red River.—Opinion respecting Indian Title.—Importance of the Question.—Treaty of the Americans with the Saulteaux for the northern part of Minnesota on Red River.

The question of Indian title is one of very great interest and importance in regard to the future peace of the colony, and as much misapprehension appears to exist respecting the territorial rights of different tribes of Indians, and their title to the land they now claim, the present condition of the question may be noticed here, as far as the slender and unconnected evidence at command admits. In Canada much trouble, great expense, and endless inquiry have been created by Indian claims, which even now remain in part unsettled, and are a source of many incidental expenses to the Government, which might have been avoided if proper arrangements had been made at the right season. In Rupert's Land, where disaffected Indians can influence the savage prairie tribes and arouse them to hostility, the subject is one of great magnitude; open war with Sioux, Assinniboines, Plain Crees or Blackfeet, might render a vast area of prairie country unapproachable for many years, and expose the settlers to constant alarms and depredations. The Indian wars undertaken by the United States Government during the last half century, have cost infinitely more than the most liberal annuities or comprehensive efforts for the amelioration of the condition of the aborigines would have done; and in relation to the northern prairie tribes, war is always to be expected at a day's notice.

The encroachments of western settlers upon Indian lands are constant and increasing in the United States, and there is no reason to suppose that these encroachments will diminish for many years to come. Already the Red River south of the boundary line, as well as its south-western tributaries, are invaded from the valley of the Mississippi, and as the territory of Dakotah has not yet been ceded to the United States Government, the prospect of a war with the Sioux, whose hunting grounds embrace it, becomes daily more imminent. Lieutenant Warren, who has conducted several United States' exploring expeditions in Dakotah and Nebraska territories, remarks: "The advance of the settlements is universally acknowledged to be a necessity of our national development, and is justifiable in displacing the native races on that ground alone. But the government, instead of being so constituted as to prepare the way for settlement by wise and just treaties of purchase from the present owners, and proper protection and support for the indigent race so dispossessed, is sometimes behind its obligations in these respects; and in some instances Congress refuses or delays to ratify the treaties made by the duly authorized agents of the government. The result is, that the settler and pioneer are precipitated into the Indian's country, without the Indian having received the first consideration promised him; and he often, in a manner that enlists the sympathies of all mankind, takes up the tomahawk in defence of his right and perishes in the attempt." * The same officer states that there are so many inevitable causes at work to produce a war with the Dakotahs (Sioux) before many years, that he regards the greatest fruit of his explorations to be the knowledge of the proper routes by which to invade their country and conquer them, but at the same time he thinks that many of the causes of war with them might be removed by timely action in relation to the treaties made with them.

The country of the Dakotahs borders on British territory, some of the tribes (the Ihanktonwanna, par. 5, p. 154, Vol. II.) are the confirmed enemies of the half-breeds and Ojibways of Red River; peace has often been made, but as often broken again upon trivial and even accidental grounds.

The frontier tribes can muster at least two thousand warriors by uniting with several of their more southern allies. Being the most warlike and numerous Indians in the United States territories, and their hunting grounds interlocking with those of the Crees in British America, they will probably yet play an important and active part in the future of the colony and the new adjoining territory of Chippewa.†

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* Preliminary Report of Explorations in Nebraska and Dakotah in the years 1855–6 and 1857, by Lieut. G. K. Warren, Top. Eng. U.S. army.

† The new territory of Dakotah is to be composed of a part of the present territory of that name and a portion of Nebraska, and bounded as follows:—The forty-sixth meridian of north latitude on the north, Minnesota and

Thickwood Crees, Swampy Crees, Plain Crees, and Ojibways are the Indian nations who now occupy that part of Rupert's Land where settlements would first be made. These nations are friendly to one another and hostile to the Sioux. They are, in fact, the hunters of the Hudson's Bay Company, and consequently friendly with that body, who have never sought to extend the settlements of the white race in Rupert's Land; but of late years since the questions relating to title to lands, annuities, and compensation have been raised, they are becoming dissatisfied, suspicious, and untrustworthy.

The Right Honourable Edward Ellice, M.P., in reply to a question put by Mr. Christie during his examination before the Select Committee on the Hudson's Bay, respecting the extinction of the Indian title in Rupert's Land, stated that "the English Government never extinguished the Indian title in Canada when they took possession; the Americans, while they have been extending their possessions, have extinguished the Indian title, but in Canada there has never been any treaty with the Indians to extinguish the title, the Crown, retaining certain reserves for the Indians, has always insisted upon the right to

Iowa to the mouth of the Big Sioux on the east, on the south following the Missouri river from the mouth of the Big Sioux to the mouth of the Nebraska, and along the Niobarah to the one hundred and second meridian of west longitude, along the hundred and second meridian to the forty-third parallel north latitude, thence along the forty-third parallel to the crest of the Rocky Mountains, and on the west by Washington Territory. This territory will consist of about one hundred and thirty-five thousand square miles. This does not include or interfere with any of the settled portions of Nebraska.

Chippewa is an entirely new territory, and is composed of the northern part of Dacotah and Nebraska, bounded as follows:—The British Possessions on the north, Minnesota on the east, the forty-sixth parallel of north latitude on the south, and Washington on the west. This will make an area of about one hundred and thirty thousand square miles.

occupy the lands, and to grant the lands."* This reply to a question now about to assume an importance in regard to the Red River Settlement of the greatest magnitude, is liable to produce a very erroneous impression respecting the Indian title in Canada, and the respect which has been paid to it during the history of that country. It is desirable that this point should be clearly stated, and with this object the proclamation of 1763 as far as it relates to the Indians in Canada is appended.

"And we do further declare it to be our royal will and pleasure, for the present as aforesaid, to reserve under our sovereignty, protection, and dominion, for the use of the said Indians, all the lands and territories not included within the limits granted to the Hudson's Bay Company; as also the lands and territories lying to the westward of the sources of the rivers which fall into the sea, from the west and north-west as aforesaid. And we do hereby strictly forbid, on pain of our displeasure, all our loving subjects from making any purchases or settlements whatever, or taking possession of the lands above reserved without our special leave and license for that purpose."

The report of the commissioners appointed to investigate the Indian affairs in Canada in 1847, thus state their views on the question of title to lands:—

"Although the Crown claims the territorial estate and eminent dominion in Canada, as in other of the older colonies; it has, ever since its possession of the province, conceded to the Indians the right of occupancy upon their *old hunting grounds*, and their claim to compensation for its surrender, reserving to itself the exclusive privilege of treating with them for the surrender or purchase of any portions of the land. This is distinctly laid down in the proclamation of 1763, and the principle has since been generally acknowledged and rarely infringed upon by the Government. The same rule has been followed by the Government of the United States, who pay annuities for the surrender of Indian lands to the extent of about 140,000*l.* a-year."*

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* Question 6001, Blue Book.

Great and apparently reasonable doubt exists respecting the Indian title to that part of the valley of Red River and the Assinniboine now occupied by the settlements. The royal charter for incorporating the Hudson's Bay Company, granted by Charles II., A.D. 1670, transferred to the Company the trade, lands, mines, minerals, fisheries, &c., of Rupert's Land. The territory to be reckoned one of his Majesty's plantations or colonies in America, and the Governor and Company to be the Lords Proprietors of the same for ever.†

On the 12th June 1811 the Hudson's Bay Company made a grant of lands to Lord Selkirk included within the following boundaries:—"All that tract of land or territory bounded by an imaginary line running as follows, that is to say, beginning on the western shores of the Lake Winnipeg at a point in 52° 30′ north latitude, and thence running due west to the Lake Winnepego-sis, then in a southerly direction through the said lake so as to strike its western shore in latitude 52°, then due west to the place where the 52° intersects the western branch of Red River, the Assinniboine River, then due south from that point of intersection to the height of land, which separates the waters running into Hudson's Bay from those of the Missouri and Mississippi, then in an easterly direction along the said height of land to the source of the Winnipeg River (meaning by such last-named river the principal branch of the waters which unite in Lake Seiganagah), thence along the main stream of these waters, and the middle of the several lakes through which they flow, to the mouth of the Winnipeg River, and thence in a northerly direction through the middle of Lake Winnipeg to the place of beginning."*

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* *"*Report on the Affairs of the Indians in Canada." Legislative Council, Sessional Papers, Appendix T, 1847.

† See the Royal Charter of Incorporation, page 409 of the Report from the Select Committee on the Hudson's Bay Company.

Ross, in his "Red River Settlement, its Rise, Progress, and Present State," introduces a treaty made between Lord Selkirk and certain Indian chiefs, Crees and Saulteaux (or Ojibways), on the 18th July, 1817, in which the chiefs agree to give unto the king, for the use of the Earl of Selkirk, a considerable tract of land on the Assinniboine and Red Rivers for the quit-rent of 100 lbs. of tobacco, to be paid annually to the chiefs and warriors of the Cree and Saulteaux tribes then occupying the country.†

In 1857 Peguis, an immigrant from Pigeon River, Lake Superior, at Red River, sent a letter to the Aborigines' Protection Society, London, complaining of the non-fulfilment of this treaty. The following extract from the letter sent by Peguis is published in the Blue Book‡:—

"Many winters ago, in 1812, the lands along the Red River, in the Assinniboine country on which I and the tribe of Indians of whom I am chief then lived, were taken possession of, without permission of myself or my tribe, by a body of white settlers. For the sake of peace, I, as the representative of my tribe, allowed them to remain on our lands on their promising that we should be well paid for them by a great chief, who was to follow them. This great chief, whom we call the Silver Chief (the Earl of Selkirk), arrived in the spring after the war between the North-west and Hudson's Bay Companies (1817). He told us he wanted land for some of his countrymen, who were very poor in their own country; and I consented, on the condition that he paid well for my tribe's land, he could have from the confluence of the Assinniboine to near Maple Sugar Point on the Red River (a distance of twenty to twenty-four miles), following the course of the river, and as far back on each side of the river as a horse could be seen under (easily distinguished). The Silver Chief told us he had little with which to pay us for our lands when he made this arrangement, in consequence of the troubles of the North-west Company. He, however, asked us what we most required for the present, and we told him we would be content till the following year, when he promised again to return, to take only ammunition and tobacco. The Silver Chief never returned, and either his son or the Hudson's Bay Company have ever since paid us annually for our lands only the small quantity of ammunition and tobacco which in the first instance we took as a preliminary to a final bargain about our lands." . . . .

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* Part of this deed is published in the narrative of Major Long's Expedition to the Source of St. Peter's River, 1824. The above extract is from the Blue Book. Major Long's quotation varies in the spelling of a few names of places, and concludes with the words, "which territory is called Ossiniboia."

† This treaty is signed by Lord Selkirk and the following chiefs:—

Moche W. Keocab (Le sonent).
Mechudewikonaie (La robe noir).
Pegowis.
Ouekidvat (Grande oreilles).
Kayajiekebinoa (L'homme noir).

‡ Page 445, Report from the Select Committee on the Hudson's Bay Company.

In March, 1859, Peguis dictated another letter on the subject of the title of his tribe to a portion of the lands on Red River. This singular communication, as published in the "Aborigines' Friend and Colonial Intelligencer," is as follows:—

"I Peguis, × (his mark), Salteaux Chief of the Indian Settlement at Red River, wish to make my statement to the Great House across the great waters.

"I and my people have our minds much disturbed by the Hudson's Bay Company, because the said Company have never arranged with me for our lands. We never sold our lands to the said Company, nor to the Earl of Selkirk; and yet the said Company mark out and sell our lands without our permission. Is this right? I and my people do not take their property from them, without giving them great value for it, as furs and other things, and is it right that the said Company should take our landed property from us without our permission, and without our receiving payment for the same? I have asked the said Company for payment, through their agents, and I asked Mr. Mactavish for the same thing, last spring, but I got nothing for my lands.

"If I were nearer the Great House, I would speak much and loud. I and my people are disturbed, and will the Great House approve of another Fur Company being chartered from Canada? Will there be another Company for the North, and another for the South? Will the Great House sanction more hostilities as before, when there were two Fur Companies trading in our country? And will another Company take in land for five miles on each side of the great road to be made between this place and Canada, without consulting me and my brother chiefs? I speak loud: listen! We have had enough of all Fur Companies. Please send us out rather mechanics and implements to help our families in forming settlements, and to secure as reserves, &c.

"I, Peguis, × (his mark), moreover, hereby agree with the letters which my brother chiefs, Makasis, Kes-kisimakurs and Wa-was-ka-sis, sent across the great waters to Mr. Isbister, and to the Aborigines' Protection Society last spring about our lands, and pray the great Mother to take us all under her own protection, and to rule the country for us herself.

"PEGUIS, × (his mark).

"Given under my hand this 21st day of March, 1859.

"Signed by Peguis, Saulteaux Chief of the Indian Settlement, in the presence of the undersigned,

"JOSEPH MONKMAN,
"JOHN HOPE."

In reply to this "statement to the Great House," Mr. Andrew McDermott, a well-known, influential, and wealthy Red River trader, who has been in the country since 1812, refers to the treaty with Lord Selkirk, stating that since the date of the treaty, the Indians, or their descendants named therein, have received an annual payment of 8*l.*

sterling from the Hudson's Bay Company*, and calls attention to the notice conspicuously posted by order of the chiefs in various parts of the settlement in 1858, warning the settlers that if they cut hay beyond the two-mile boundary referred to in their treaty with Lord Selkirk, their stacks would be destroyed. The letter called forth a strong expression of opinion from a large meeting of half-breeds convened for the purpose on the 7th March, 1860, when the following resolutions were adopted:—

> "1st. That the Cree chief, Senna, who has the best claim to this country, never disposed of it to the Earl of Selkirk or the Hudson's Bay Company.
>
> "2nd. That the Hudson's Bay Company do not, as is alleged, pay 8*l.* sterling per annum to each of the five chiefs mentioned in Mr. McDermott's letter.
>
> "3rd. That the paltry presents given to some or all of these chiefs for many years after 1816, were not given in the way of payment for lands; but merely to keep them friendly towards the Company. The friendship of these chiefs was important, not only because their hostility might have been dangerous, but because they could, by using their influence with their people, bring a large quantity of furs to the Company.
>
> "4th. That presents similar to those given after the year 1816, were given for thirty or forty years before that date, for the purpose of "keeping in" with the Indians; and given not only to the chiefs of this district, but to every influential Indian throughout the country.
>
> "5th. That as no proper arrangement has been made with the native tribes regarding their lands, the 'half-breeds' who are now on the soil, and who, besides being natives, are the immediate representatives of these tribes, ought to use every legitimate means to urge their claims to consideration in any arrangement which the Imperial Government may see fit to make.
>
> "With these points agreed upon, it was resolved to adjourn the meeting until the month of May or June, when the various chiefs referred to would be in the settlement, and when certain persons who were now out wintering, would also be here to corroborate the above facts."

It would be altogether premature to discuss the claims presented by different nations and chiefs to the Red River country; but it is clearly evident that the subject will require close investigation and prompt action in order to avoid troublesome disputes. It is also apparent that the calls of humanity, the interests of the new colony, and the claims of the Indians, imperatively demand that the natives should be paid for their lands in such a manner that the future to them may not possess the sad and hopeless aspect which has too long met the gaze of the Indian race in Canada, whose hunting-grounds have been purchased with much apparent commiseration for their condition, but with tardy and inadequate attempts to arrest the fate which, under such neglect, inevitably awaits them.

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* This statement is not substantiated by the evidence of Sir George Simpson, Blue Book, Question 109.

The Americans have secured a tract of country thirty miles deep on either side of Red River, extending from the boundary line to Buffalo River on the east bank, and Goose River on the west bank. The area of this tract is between 4,000,000 and 5,000,000 acres, and the sum paid for it was $30,000 cash, and $10,000 per annum for twenty years, $2000 of this annuity being reserved by the President, and applied to the improvement of the Indians. The date of this treaty is 1851.

Ross says[*] that the Assinniboines, Plain Crees, and the Ojibways (Saulteaux) all laid claim to the land, but the title of Ojibways has always been most disputed, they being invaders of the country; yet, being found by the Americans on the spot, they were recognized as the lords paramount of the soil. Their principal chiefs, however, absented themselves, being distrustful, lukewarm, and unwilling to sell their lands; and the treaty was ratified with those of secondary rank who attended the meeting, summoned by the Governor of Minnesota.

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[*] Appendix to the Red River Settlement, &c.

CHAP. XXXII.

MISSIONARY LABOUR AND ITS RESULTS.

Indians in Canada.—Distinction between Indian Nations and Tribes.—The Ojibways and Mistassins.—Families, Nations, Tribes, and Bands.—Indian Families of Rupert's Land and Canada.—The Algonquins and Iroquois.—The Hurons or Wyandots.—Dispersion of the Hurons.—The Iroquois Confederation.—Statistics of Indians in Canada.—Canadian Special Commission.—The Indian Department.—Efforts to ameliorate the Condition of Indians.—The Manitoulin Islands and the Mission at Manitouaning.—The Roman Catholic Missions.—Their School and Village.—Wikwemikong.—Wesleyan Methodist Missions.—Indian Labour Schools.—Cause of the Failure.—Condition of some Indian Villages in Canada.—The Indians of the Northern Coast of Lakes Huron and Superior.—Treaty with these Indians.—Distribution of Annuities.—Hudson's Bay Company.—Sale of Birthrights.—Suggestion with Reference to a Permanent Fund for the Supervision and Instruction of Indians.—Lands surrendered by Indians in Canada.—Testimony of Missionaries and Agents in Relation to Indians.—Advantage of Settled Homes.—Compact Reservations.—Indian Progress in Michigan.—At Red Lake.—At Red River.—Suggestions with regard to the Amelioration of the Condition of Indians generally.—Missionary Labour in Rupert's Land.—The School-house.—Suggestion for the Establishment of a General Store for Outposts.—Native Language.—The Bishop of Rupert's Land.—His Charge, January, 1860.—The Earl of Southesk.—A Christian Assinniboines' Band.—The Church in the Wilderness.

THE prospective condition of the Indian race in Rupert's Land will be greatly dependent upon the steps which may be taken by the future government of the country, to provide for their instruction in the Christian religion; their assumption of a settled mode of life, and their consequent advancement in civilization.

The experience of a century in Canada cannot be overlooked in any discussion of the measures which appear to commend themselves for encouragement or adoption, in order to secure the amelioration of the condition of this people, whose claims upon the sympathy and protection of the civilized invaders of their hunting-grounds no humane man can dispute. A partial foreknowledge of their destiny, under providence, may be gleaned from an examination of the condition of Indians living in the midst or on the borders of civilized communities, where experiments for their benefit have long been tried, and where the results are perfectly well but not widely known.

It must be borne in mind that there is as broad a distinction between Indian nations and even the tribal bands of the same nation, as between Europeans or Asiatics of separate origin or nationality. The stately and intelligent Ojibways, who formerly occupied the country about Lake Superior and the north shore of Lake Huron, and are now scattered from Lake Ontario to the Grand Forks of the Saskatchewan, ought not to be brought into comparison and classed with the barbarous Mistassins, who hunt and fish on the lower St. Lawrence, although both nations belong to the same great family, and speak dialects of a common language.

Even among different tribes of the same nation, great distinctions are found to prevail, which may be generally traced to the physical characters of the country they inhabit. The Swampy Crees of Lake Winnipeg are far inferior to their brethren of the prairies, and the Ojibways of Tecamamionen or Rainy Lake, are superior to other tribes of the same nation who hunt on the north shores of Lakes Huron and Superior. The same remark applies to "Bands" belonging to different tribes. The Berens River Band, and the Bloody River Band on Lake Winnipeg are low in the scale when compared with the Dauphin River Band, and those who hunt on Lake Manitobah. These minor points arise into importance in reviewing the progress made by different bands, when subjected to missionary influence.

Much misapprehension and perplexity have arisen from the different application by writers of the terms "Family," "Nation," "Tribe," and "Band" in describing the peculiarities of the Indian race. A few words on this subject may not be out of place. At the present day five great Indian "Families," as distinguished by languages of a radically distinct character, occupy the northern portion of the North American continent east of the Rocky Mountains.

They are as follows :—

I. Esquimaux.
II. Chipewyans.
III. Algonquins.
IV. Dakotahs.
V. Iroquois.

The Esquimaux occupy the Arctic coast, and are essentially a maritime people.

The Chipewyans, the region south of the country of the Esquimaux, and live in the woods north of the 55th parallel.

The Algonquins are in possession of the valley of the St. Lawrence, and of the country north of a line drawn from the head waters of the Mississippi, to the north branch of the Saskatchewan ; they are part prairie and part wood Indians.

The Dakotahs occupy the valley of the Missouri, and a considerable portion of the upper Mississippi. They also extend their hunting expeditions to the North Branch of the Saskatchewan, confining themselves throughout this vast region to the prairies and plains. The Iroquois must be regarded as a family nearly extinct, they are half civilized, and from intermixture with the whites, fast losing in many of their settlements, all trace of pure Indian blood.

When the Jesuit missionaries penetrated into Canada about the year 1615*, they found the country in possession of two only of these families, the *Algonquins* and the *Iroquois.*

The great Algonquin family, whose hunting-grounds then extended from the north west side of the valley of the St. Lawrence to Hudson's Bay, is composed of numerous nations speaking a common language, but embracing many dialects. Among these are included the *Ojibways*, the *Crees*, the *Potawatamies*, the *Shawnees*, the *Lenni-Lenape*, the *Delawares*, the *Ottawas*, the *Nippissings*, the *Abenakis*, the *Amalacites*, the *Montagnais*, the *Sokasis*, the *Mistassins*, and the *Mohegans.*

The *Algonquins*† are generally wanderers, without settled place of abode, living in the woods and subsisting upon wild animals, fish, fruits, roots, and herbs.

The Iroquois family embraced the Hurons, Eries, and Mingoes or Iroquois. The *Hurons* or *Wyandots* speak a language not understood by the Algonquin nations, but allied to that of the *Iroquois.* They lived formerly in stationary villages, and cultivated the soil, growing Indian corn, pumpkins, &c. The country of the Hurons is now the

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[*] Le Père Recollet Joseph Le Caron, in 1615, ascended from Quebec to the country of the Hurons.—*Relations de quelques Missions des Pères de la Compagnie de Jésus dans la Nouvelle France.*

[†] Algonquins, or Algouméquins, a word derived from *Adirondack*, or Leaf-eaters, derisively applied to a tribe by the Iroquois, and corrupted by the early French settlers into *Algonquins.—Ibid.*

county of Simcoe in Western Canada, and the once celebrated missions of St. Ignace, St. Louis and Ste. Marie were respectively situated at, or near the extremities of, Sturgeon, Hog, and Gloucester Bays of Lake Huron. The Hurons occupied this limited area with a population of about 30,000 souls, living in eighteen walled villages, until the year 1650, when they were destroyed or dispersed by the murderous Iroquois. When the remnant fled from their enemies, they separated into five divisions; the first band retired to the Manitoulin Islands, but eventually joined another part of the fugitives who had fled to Quebec, where their descendants occupy the village of La Jeune Lorette. They number now 282 souls, but by intermixture with the whites, they have so lost the original purity of their race, that they scarcely deserve the appellation of Indians. Their agricultural progress may be inferred from the fact, that although they possess 1657 acres, very little is cultivated, and the present farming stock of the tribe amounts to fourteen cows, five horses, and nine pigs. They produced in 1857, 310 bushels of grain, and fourteen tons of hay. They possess one harrow and 63 hoes or spades. Such is their progress after two centuries of instruction and guidance under the Jesuits.

The second band applied to be received into the families of their conquerors, and they were incorporated with the Tsounontonans of the five nations of the Iroquois. The third band found a temporary asylum in the island of Michillimakinac at the upper extremity of Lake Huron, but being followed by the Iroquois, they retreated to the Mississippi, where they encountered the Sioux, who at this time were engaged in extending their territory towards the east, like the Iroquois in the contrary direction. The unfortunate Hurons retired to the shores of Lake Superior, but were followed by the Sioux, and ultimately compelled to retrace their steps to Michillimakinac about the year 1670, where the remnant now dwells. The fourth and most ill-fated of the Huron bands sought refuge among the *Eries*, who occupied the country on the north shores of Lake Erie. They spoke the same language as the Hurons and Iroquois, and lived in permanent villages. The presence of the Hurons among them soon excited the jealousy of the Iroquois, so that after a very short period had elapsed, both the Eries and the greater part of their Huron allies were cut off by the savage, envious, and relentless Iroquois.

The fifth band retired to the new French colony in the lower St. Lawrence, where they were joined by the first band as already stated.

According to the narrative of Sagard, the first historian of the Hurons, they occupied a distinguished position among savage nations. The Hurons represented the nobility of the country, some of the Algonquin nations represented the citizens, and the Montagnais, an Algonquin nation, the poor.*

The Iroquois Confederation consisted originally of a union of five nations, named respectively the *Mohawks* †, the *Oneidas*, the *Onondagas*, the *Cayugas* and the *Senecas*.

They invaded the country of the Hurons about 1650, and were in turn driven back by the Algonquins, into whose hunting-grounds north and north-east of Lake Huron, they appear to have penetrated. After their retreat the Ojibways, and particularly the Missassaguas, the "eagle" tribe of the Ojibways, following them, occupied permanently the central portion of the peninsula of Western Canada.

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* Relation Abrégées, &c. &c.

† The Mohawks, Onondagas, and Cayugas are the oldest members of the Confederacy. Their union precedes tradition.

In 1712 the Tuscaroras of North Carolina, subsequently to their defeat by the English, united with the Iroquois and formed with them the confederary of the Six Nations.

At the time of the first discovery of Canada, the Iroquois occupied the south-east valley of the St. Lawrence, especially the south shore of Lake Ontario and the region about the small lakes which still bear the names of the different nations. At the close of the war of independence, being firm allies of the British, they migrated into Canada, and in 1784 a part were established on the Grand River on a tract comprising about 700,000 acres, which was confirmed to them in 1739 by letters patent. In 1845, there remained in the hands of these Indians 52,133 acres, the other portion having been surrendered at different times. This part of the remnant of the famous Six Nations, now numbers on the Grand River 2550, of which between five and six hundred are still pagans. The Canadian Iroquois did not exceed 5000 in 1857.

The following table shows the total number of Indians in Canada at different periods from 1827 to 1857 :—

UPPER CANADA.*		LOWER CANADA.†	
1838	6,643	1827	3,649
1844	6,874	1837	3,575
1846	8,756	1844	3,727
1847	8,862	1852	4,058
1857	9,094	1857	4,396

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* Not including the Indians of the north shore of Lakes Huron and Superior, which number respectively, from the Sault Ste. Marie to Pigeon River, six bands, containing 1240 Indians, and from the Sault Ste. Marie to French River, seventeen bands, containing 1422 souls.

† The Indians in the Lower St. Lawrence are not included. They are

In 1857 the Indian census, including settled and migratory tribes, and tribes not within reach of the Missionaries, gave the following numbers of this people: —

Settled Indians in Upper Canada	9,094*
„ Lower Canada	4,326
Nomadic tribes visiting the north shore of Lake Huron	1,422
„ „ „ Lake Superior	1,240
Nomadic tribes of the Lower St. Lawrence	2,500
„ not within the reach of missionaries or agents (estimated)	1,000
Grand Total	19,652

The Indians within the reach of government in the year 1818 were estimated at 18,000, but since that period immigration and the extension of the influence of the government will probably account for the apparent increase observed since 1818.

In 1856 the Canadian Government appointed a special Commission to "inquire into and report upon the best means of securing the progress and civilization of the Indian tribes in Canada, and on the best mode of so managing the Indian property, as to secure its full benefit to the Indians, without impeding the settlement of the country."†

The Indian Department takes cognizance of everything relating to Indians in Canada, and in order to carry out the business belonging to it, the province is divided into five districts, each under the charge of a local superintendent.

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chiefly *Montagnais* tribes. The *Mistassins* and *Naskapees* number about 2500, of whom 1500 are still pagans, sacrificing to the Deity, who they say inhabits the sun and the moon, a portion of everything they kill.

[*] Compare these numbers, from official returns, with the estimate by the Hudson's Bay Company of Indians settled in Canada (3000), p. 159.

[†] In the subsequent notice of the Indians in Canada, much of the information is obtained from the Report of the Canadian Commissioners, appointed in 1842 and 1856.

The first district embraces the whole of Eastern Canada, and a small part of the Upper Province. The second stretches from the western limits of the first to the head of Lake Ontario, comprising also the Saugeen Peninsula, and some of the islands in Lake Huron. The affairs of the six nations, or Iroquois, on Grand River, and those of the Mississaguas in the township of Tuscarora, occupy the exclusive attention of a third superintendent. The tribes resident throughout the western peninsula of Canada are under the charge of a fourth, and the bands in the occupation of the Manitoulin Islands, together with the tribes on Lakes Huron and Superior, form the limits under the fifth superintendent.

No opportunity has been lost, and no pains have been spared, since Western Canada became a province, in planning, suggesting, and advocating schemes for the amelioration of the present and the brightening of the prospective state of Indians in Canada. Secretaries of State, Governors of provinces, and special Commissioners have all interested themselves in the condition of the Indians, and suggested measures for their benefit; but as the Canadian Commissioners say: "With the fatality which seems to have attended this unfortunate race, various obstacles appear to have arisen which prevented these benevolent and judicious projects from being carried out." "We are still groping in the dark, the time for experiments is fast passing away, if it has not already expired." The Commissioners see, however, no reason why the Indian race should not in time take their place among the rest of the population of Canada. A study of their history shows that they have all a greater or less appreciation of the blessings of civilization, and desire their children to be educated like the white man.

The theory of the steady decline of their number is *posi-*

tively controverted by experience, when they are established in villages and properly superintended. There is no inherent defect in the organization of the Indians which disqualifies them from being reclaimed from their savage state. Their general amelioration or marked advance towards civilization, must be the result of long and patient labour, and the development of many years. The absence of action in carrying out the several plans suggested has been most prejudicial to the Indians, yet among the experiments which have been tried, the results in some instances have shown how much can be accomplished for this interesting people when zealous and painstaking officers are intrusted with their superintendence and guidance.

Perhaps no better illustration of the results attending the isolation of Indians, and their instruction in the arts of civilization, can be afforded than that offered by the Manitoulin Islands.*

In 1836 Lieutenant-Governor Sir Francis Head, proposed to collect on Manitoulin, not only the wandering bands on the north shore of Lake Huron, but also the tribes settled in all parts of Upper Canada.†

The scheme was a failure, the only Indians availing themselves of the offer being some from the United States, and from the shores of Lake Superior and Huron. The village of Manitouaning was built by the Canadian Government, and placed under the management of a resident superintendent, assisted by a clergyman, a surgeon, and a schoolmaster. Artisans were induced to go there and take charge of workshops, in which Indians were to be taught useful mechanical trades. Contributions from private parties to aid in the work were obtained through the exertions of the missionary and others. The population in 1843 was estimated at 90 individuals. The only other village on the island at that time was Wikwemikong, founded previous to 1836 by Ottawa Indians from Michigan, who had long been converted from heathenism by Roman Catholic missionaries and possessed some knowledge of agriculture before their arrival on the island. In 1843, this village contained 73 Indian houses and was estimated to comprise 376 individuals. There were also a church, a school-house and a saw-mill, together with a house for the missionary and one for the schoolmaster.

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* The Great Manitoulin Island at the head of Lake Huron is 135 miles long, and from 20 to 25 miles broad. The shores of the island are hilly, and clothed with cedar, pine, and birch. The soil of the hills is stony and barren. In the interior of the island are about 20 lakes, some fully 15 to 18 miles long, and from 8 to 10 miles wide, and from 3 to 20 fathoms deep. They abound with trout, pike, white fish, &c. The extent of arable land on the island is about one-third of its area. The trees on the arable land are elm, maple, birch, cherry, and a few oak and beech. The climate is remarkably healthy.—*Description of the Great Manitoulin by the Roman Catholic Missionaries.*

† See Report of the Special Commissioners, appointed on the 8th September, 1856, to investigate Indian affairs in Canada. Printed by order of the Legislative Assembly, 1858.

In 1857 the total Indian population of the island was 1290, being composed of 977 Catholics, 104 Protestants*, and 145 Pagans, occupying 13 stationary villages and 60 birch-bark tents. With respect to the Protestant village of Manitouaning the Commissioners said in 1857: "Many of the buildings are deserted and ruinous—the school-house is dilapidated and untenable, and the workshops from which the mechanics are withdrawn, are destitute of tools, deserted by the Indians who formerly worked there, and in an utter state of decay. The church is in tolerable repair, *but we found no Indian attending the services.*"

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* The Protestant missionaries claim 117 converts on the island.

"The school returns show twenty children as receiving instruction; but the greatest number of days during the last quarter, on which any one child attended the school, was fourteen, and ten of the children do not appear to have been present for a single day." The Rev. Mr. Jacobs stated in 1857, that the number of Indians at his station belonging to his congregation was forty-two.

The Commissioners report his settlement to be "in a much more prosperous condition than Manitouaning, both houses and farms being tidy and kept in better order."

The Roman Catholic Mission is next described by the Commissioners.* Wikwemikong contains a population of 580 all belonging to the Roman Catholic Church. "Although not so well situated as Manitouaning, prosperity smiles upon the settlement.

"The Indians appear respectable in their dress, industrious in their habits, healthy and contented; the services of the church are reported to be numerously attended; the schools were crowded with clean, healthy, intelligent children of both sexes, numbering 125 in the school register. We satisfied ourselves by examination, that the average attendance has been of late for the boys 45 days in the quarter and 56 days for the girls.

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* It will be a subject of deep regret to members of the Church of England that the Canadian Commissioners felt it their duty to recommend that a year's gratuity should be given to the resident Protestant missionary at Manitouaning, and that he should be placed on the retired list; also, that the Protestant English school should be abandoned as "practically useless," and simultaneously with this negative evidence of inefficiency and failure, they should feel themselves compelled to recommend that a schoolmaster should be appointed in the Roman Catholic Mission at Wikwemikong. No doubt the recommendation was just, and conveyed an appropriate acknowledgment of the untiring zeal, and unfailing energies of the Roman Catholic Missionaries. With respect to the other villages on the Manitoulin Island, the Commissioners say:—"Notwithstanding that Christianity is making slow and painful progress among them, they must still be considered as almost at the bottom of the scale of civilization."

"The village, which has been erected entirely by the Indians themselves, contains a spacious church, substantially built of stone, plainly finished, and decorated inside in Indian style. The missionaries' house, which has been built for them by their congregation, is also of stone."

In 1848 a manual labour school was built at Alderville in the county of Northumberland, Upper Canada, at a cost of $6,328, and a further sum of $515 has since been laid out in repairs. Another school at Muncey Town was finished in 1851, the amount expended on it being $5,500. In 1856 it was found necessary to enlarge this school, involving an additional outlay of $3,660, and in 1857 repairs to the amount of $640 raised the total sum expended to $9,800. These schools are appropriated to Ojibways and Missassaguas. The management was entrusted to the Wesleyan Methodist Society. The Indian Department pays the Society for the board, clothing, and education of each child from a fund derived from the annuities of the tribes benefited by the schools. The average annual cost of each child has been $64 per head. The Wesleyan Methodist Society engaged to supply furniture, books, stationery, stock and farming implements, as well as to pay the superintendent and teachers, and to provide such assistance as would be necessary to efficiently conduct the institution. The average attendance at these schools has been, at Alnwick, twenty-three boys and sixteen girls; at Muncey Town (Mount Elgin), twenty boys and twenty-one girls. The management has been good, but the results have not answered the expectations of the projectors and sustainers.

In 1857 each farm attached to the different schools had about seventy acres under crop, but the amount expended by the Society in addition to the sum paid by the Indian Department was $2,200. The impression produced on the children is very transient. "They do not seem to carry back with them to their homes any desire to spread among their people the instruction which they have received. They are contented as before to live in the same slovenly manner, the girls make no effort to improve the condition of their houses, nor do the boys attempt to assist their parents steadily on the farm."

The Commissioners think that the following obstacles have impeded the success of the experiment:—

First, the children are too old when they are received into the institution.

Secondly, they remain too short a time at these establishments.

Thirdly, the system does not make any provision for the settlement in life of those who complete their education.

Fourthly, neither the funds at the disposal of the Indian Department, nor those furnished by the Society have been sufficient to enable them to extend the system of practical education so as to include any of the mechanical arts. After seven years' experience of the effects of those schools, the Commissioners recommended the withdrawal of the annual portion of the funds furnished by the Indian Department from Indian revenues, which, it was suggested, should revert to their original object at the commencement of the next financial year.

Such is the cheerless conclusion of an experiment as far as the Indian Department was concerned, where the result might have been very different if one establishment had been assisted with the funds applied to both. One hundred and thirty dollars per annum for each child does not appear too large a sum in order that so important an experiment, promising such excellent results if efficiently carried out, should be thoroughly tested.

The present condition of the several villages which have been built by Government for the Indians in different parts of Canada, reveals a deplorable condition of decay into which long continued neglect has brought them. "The Indian is content to inhabit a hovel so dilapidated as to be hardly tenantable, without exerting himself to put it into repair." This lamentable state of affairs appears to occur only in the absence of strict supervision.

The northern coasts of Lakes Huron and Superior remained in the occupancy of nomadic bands of Ojibway Indians until the year 1850, when the whole of this vast extent of country with the exception of certain reserves was surrendered to the Canadian Government for the sum of $16,640 paid down and $4,400 in perpetual annuity, of which $2,400 is payable to the tribes on Lake Huron and $2,000 is divided among those inhabiting the shores of Lake Superior.

The number of Indians inhabiting the northern shores of Lake Huron in 1850 was only 1,422 and of Lake Superior 1,240, making a total Indian population of 2,662 souls over an extent of country exceeding England in area, and not yet approached by civilization except at the Hudson's Bay Company's posts, and at a few mining locations. Of the 1,422 Indians on the north shore of Lake Huron 317 are Christians, divided as follows:—Catholics 294, Wesleyans 20, Church of England *three.* Many of these Indians, it may be with propriety mentioned here, visit Manitouaning, on Manitoulin Island.*

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* The Commissioners state that "These tribes live for the most part by hunting, and on the produce of their fisheries, although they do raise a few potatoes, and a little Indian corn; and they find a market for disposing of their peltries and supplying themselves with necessaries at the posts of the Hudson's Bay Company. They are quite nomadic in their habits; seldom living or remaining long in one spot, and contented with the shelter afforded

In commenting upon the treaty which surrendered to the Canadian Government a territory as large as England, rich in minerals, fisheries, and forests, and tenanted by 2662 Indians, part of the remnant of that great Algonquin confederacy, which two hundred years ago drove the Iroquois to the south shore of Lake Ontario, the Commissioners say, " if we considered that it came properly within our province, we should not hesitate to express our decided regret, that a treaty, shackled by such stipulations, whereby a vast extent of country has been wrung from the Indians for a comparatively nominal sum, should have received the sanction of the Government."

The distribution of the annuities to the Lake Superior Indians is made through the agents of the Hudson's Bay Company, who have " voluntarily assumed " and faithfully discharged this task. It will not escape notice that the voluntarily assumed distribution tends to secure the services of the Indians as permanent hunters to the different fur-trading posts, where they assemble to receive their miserable pay for the vast extent of country surrendered. Many will be disposed to ask why no portion of the annuities or of unclaimed arrears should have been reserved for evangelizing, educating, and establishing in permanent villages, these wandering savages, in the hope of reclaiming a few of their number from barbarism. If the poor remains of once numerous and powerful tribes are encouraged to continue their nomadic habits of life, they will perish one by one from the face of the earth, leaving no records behind them but " treaties " to

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by a bark wigwam or a hut of reeds. It is only during the spring and autumn, when they come down from the high grounds to the border of the lake, that they are accessible to those who would urge on them the necessity of Christianity and civilization. There is no difficulty, therefore, in accounting for the small apparent results of the labours of the missionaries."

show with what utter absence of reflection and forethought they sacrificed their country and the rights of their children. This almost wanton indifference to the future shows that they possess an irresistible claim to the care and sympathy of a powerful Christian government. When many thousand pounds yearly are solicited and willingly contributed by the great charities of England to the spread of the Gospel among Indians who still claim and possess the soil, it would surely be true charity, as far as Rupert's Land is concerned, to urge the importance of establishing a fund from the proceeds of the sale of lands, after the Indian title is extinguished as a preliminary to settlement, to be devoted exclusively to the instruction and supervision of those who so recklessly part with their birthright. An addition of one penny per acre to the sum paid to Indians in Canada for the lands they have surrendered, would have produced an annual sum sufficient to afford a permanent maintenance to two hundred ministers, teachers, or superintendents.

The following table shows the aggregate quantity of land surrendered at different times by the Indians of Canada, and the price which has been paid to them per acre :—

Name of Tribe.	Number of Acres surrendered.	Average Price paid per Acre.
Ojibways	7,373,000	2½*d.*
Missassagas	6,737,750	⅞ of a penny.
Ottawas, Pottawatamies, Chippewas, and Hurons . .	2,001,078	3/16 ,,
Delawares		2*s.*
Saugeen Indians. . . .	1,500,000	3½*d.*
Ojibways of Lake Superior .	Not known. 500*l.*	
,, ,, Huron . .	,, ,, 600*l.*	
Total . . .	16,137,835 acres.	1½*d.*

The complete isolation of Indians, in order to shield them from the contaminating influence of the whites, involves the necessity of stringent police regulations prohibiting the sale of spirits, otherwise the system becomes a failure.* It appears to be an established fact that the health of settled tribes is much better than that of others hovering on the borders of civilization. "Epidemics are less fatal, while the diminished exposure checks the ravages of consumption and of febrile attacks consequent on the hardships inseparable from the precariousness of a hunter's life. The more regular supply of wholesome food is another cause of the improved sanitary condition of the settled tribes."†

The scarcity of the larger animals diminishing their supply of suitable food, and the general adoption of manufactured articles of clothing, such as blankets and cloth, in place of the prepared skins of animals, in which they formerly clothed themselves, have been largely instrumental in making the present nomadic tribes more susceptible of disease than their ancestors.

The testimony of missionaries and agents, embodied in their reports to the head of the Indian Department of the United States, is unanimous in deprecating the system of frequent removal, as practised in the western territories.

Instances are not wanting, either in Canada or the United States, to show that compact reservations surrounded by the whites are a state favourable to the civilization and progress of the Indian. In Michigan, the franchise, and all other rights of citizenship, are exercised by the Indians. They there form an integral part of the population of the state, on the same footing as their white neighbours.

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* In Canada the whites follow the Indians with spirits into the bush, and obtain, at a nominal rate, the fruits of months of toil. The same occurs in Rupert's Land.

† Report of the Commissioners.

The Mission established in 1843 at Red Lake for the Ojibways who hunt south of the boundary line, may be instanced as offering a successful illustration of the force of example and the benefit of instruction. The Indians cultivate fields of Indian corn and potatoes. The houses of the missionaries are good and comfortable, and their farm is kept in as good order, and is as well cultivated as any farm in the States. It is really what is intended to be, a " model farm," and the happy results of their example are seen all around them in the well-cultivated fields of the Indians, and the excellent cabins of many of them.*

The Indian settlement at Red River, already described (Vol. I. p. 201), is another happy instance of the excellent results attending zealous missionary labour and supervision.

The Canadian Commissioners notice a curious feature connected with the advance of civilization among the aboriginal population, namely, the taste for agricultural improvement by no means keeps pace with their progress in point of mental cultivation. By giving them a direct interest in the land itself, by securing a fixed location to each family, it is predicted that their attention will be turned to the improvement of it. Hitherto each tribe or band settled within the limits of the province has held the reserves apportioned to them in common, and are by law exempt from taxes and assessments.

The conclusions at which the Canadian Commissioners have arrived, after a very patient and protracted investigation of the condition of Indians in Canada, may be thus briefly expressed †:—

1. In all cases in Western Canada where a final location of a band shall be determined upon, the head of each

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* Owen's Geological Report of Wisconsin, Iowa, &c., p. 327.

† Report of the Canadian Commissioners, Blue Book.

family shall be allotted a farm not exceeding twenty-five acres in extent, including an allowance of woodland, where they may obtain fuel; that for such farm he shall receive a licence giving exclusive occupation of the same to him and his heirs for ever, on condition of bringing into cultivation a certain number of acres in a given time.

2. When bands have been located, and houses built for them by Government, a small portion of their annuities derived from the original sale of their lands should be reserved as a fund to meet the necessary expenses attending repairs.

3. The establishment of industrial schools and model farms should be encouraged and promoted. The reports from the United States Commissioners show the most gratifying results to have arisen from this system.

4. The attendance of children at school should be enforced by fine, or a deduction of a portion of the annuities due to the parents.

5. The appointment of local agents, who should be compelled to reside among the Indians.

6. The establishment of Government stores, with a view to supply the Indians with goods at fixed rates, and to purchase their produce; also the establishment of suitable stores under licence.

7. The disuse of Indian dialects, and instruction in the English language (French in Lower Canada).

8. The gradual extinction of tribal organization.

9. The absolute prohibition of intoxicating liquors.*

The impressions produced, upon a mental review of the condition and progress of the missionary stations between Lake Superior and the Grand Forks of the Saskatchewan, nearly all of which I have visited*, have assumed the form of convictions, which I briefly introduce here merely as a traveler's record.

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* All experience tends to show that intemperance is the worst enemy of the Indian race.

While it is evident that the progress of evangelizing the heathen Indians is decidedly encouraging on the whole, much, very much, under Providence, depends upon the personal character and individual exertions of the missionary. Failure, or rather the want of that degree of success which circumstances have appeared to promise, may generally be traced to an injudicious selection of the site for a missionary station, whence arose insuperable difficulties in providing the Indians with fixed abodes, and the ultimate prospect of maintaining themselves by cultivating the soil. The Bishop of Rupert's Land refers pointedly to the problem which Rupert's Land now presents, in his journal of 1859.† "Difficulties at the two stations remain, nor would I conceal them; but they are the universal Indian difficulties—the want of food, and the consequent inability to maintain the families around a central point. This is the Indian problem, the same throughout the land, which has still to be worked out, and requires much patient thought."

Disappointment in receiving the necessary supplies for keeping up the station, and the competitive opposition of the fur-trade, are formidable difficulties of constant occurrence. Most of all, however, is the absence of success due to a natural incapacity or indisposition to fulfil the duties imposed by the position in which the missionary is placed. These imperatively demand rare qualities, which in common life it is difficult to find united in one man; patient endurance, much long-suffering, deep heartfelt sympathy for the objects of his care, a warm interest in his work, and unflinching readiness to encounter difficulties, whether they be those of language and superstition, or mere physical hardship and privation.

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* The Roman Catholic Mission of the Immaculate Conception, on the Kaministiquia, Lake Superior; the Church of England Mission at Islington, Winnipeg River; the Indian Missionary Village at Red River; Prairie Portage on the Assinniboine; the Qu'appelle Lake Mission; the Nepowewin on the Main Saskatchewan; Fairford on Partridge Crop River; the churches at Selkirk Settlement, St. John's, St. Paul's, St. Andrew's, the Roman Catholic Cathedral, the Pesbyterian Mission, and the Roman Catholic Red Lake Mission.

† The Church Missionary Record, March, 1860.

The school-house appears to be beyond all comparison, the main hope of missionary success. In order to christianize the rising generation, they must be induced to relinquish their wandering habits of life, and settle down in permanent villages. Nomadic Christian Indians are subjected to extraordinary trials, which do not readily occur to one not familiar with their character and manner of living. Indians are extremely susceptible of ridicule, and possess a great degree of family pride; they are consequently often unable to resist the jeers and scoffs of the conjurors, or rise superior to the taunts of those who upbraid them for forsaking the gods of their fathers.

It is very desirable that a missionary station should not be situated near a fur-trading post; a settled life is diametrically opposed to the fur trade, whose stability rests upon the hunters and trappers in its employ. It has happened in Rupert's Land, that when a missionary has succeeded, after years of anxiety and toil, in establishing a station, and gathered round him a little band of Indians who have embraced Christianity, a fur-trading post has been established close by, tending to unsettle and demoralize those who would otherwise have remained quiet and stationary Christians.

In such districts as Mackenzie's River, the missionary is absolutely dependent upon the Hudson's Bay Company, and indeed up to the present year, they have been more or less dependent upon the Company for supplies of every description; now, however, that goods can be conveyed very cheaply by the American steamers on Red River from Minnesota, the time appears to have arrived when the stations south of the Saskatchewan should be no longer dependent upon the Company. The establishment of a general store at Red River under the supervision of the Bishop for the exclusive use of non-resident missionaries south of the Saskatchewan, would be of immense assistance. The store should be placed under the charge of an experienced business man, and be limited in its operation to the outposts, or to missions having an exclusive Indian population. An annual sum should also be at the disposal of the Bishop, to enable him to obtain at all times the means of sending supplies to distant stations.

The want of a general familiarity with the native language is severely felt; interpreters are dangerous, nor do they always rightly understand or render the words of the missionary. The present time is eminently favourable for the selection of permanent village sites, surrounded by a sufficient area of arable and pasture land to provide for the future independence of the Indians who may be induced to settle. In the organization of a new colony, the native races will doubtless not be forgotten. The examples furnished by Canada show how much may be done under judicious management if an early beginning is made, and how much may be lost to these thoughtless people if they are not placed under proper supervision and protected by special laws.

In different parts of the narrative I have adverted to the character of missionary labour in the wilderness, as exemplified by the patient, self-denying constancy of the

Père Chonè of the mission of the Immaculate Conception on the Kaministiquia, Lake Superior, by the unceasing attention and devotion at all times and seasons of the Rev. A. Cowley at the Indian settlement, Red River, by the undaunted energy of the Rev. Archdeacon Cochrane of Prairie Portage, the exemplary perseverance of the Rev. Mr. Stagg* of Fairford, and the talented labours of the Rev. Archdeacon Hunter of St. Andrew's, recently returned from the far-off wilds of Mackenzie's River; and I shall now venture to introduce one suggestive feature in the labours of his lordship the Bishop of Rupert's Land.

Before leaving the settlement I went to pay his lordship a parting visit, and not finding him at his residence, I proceeded, as directed, to the school-house, where he might probably be found, although it was after school hours. On entering the room I found the Bishop seated between two young Cree half-breeds, *teaching them quadratic equations.* His lordship told me that the two lads showed a remarkable talent for mathematics, and for the sake of encouragement, he made a point of giving them instruction in algebra after the daily routine of the school was over, so that this extra tuition should in no way interfere with the more necessary requirements for their future station in life. This little incident forcibly impressed me with a sense of the daily duties and responsibilities which a true missionary may create for himself in remote and barbarous Rupert's Land, even though he occupy the distinguished position of a Bishop in the Anglican Church. In a charge delivered to the clergy of the diocese of Rupert's Land at St. John's, Red River, on January 6th, 1860, his lordship thus sums up the present condition of his diocese:—

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* "It is always a pleasure to mark Mr. Stagg's earnest and warm-hearted piety: he has always his one great object before him—to win souls to the Saviour, and gain some orphans for his Home. His warmth and affectionateness of manner are very contagious, and he is a great favourite wherever he goes. He wanted to obtain twenty hundred weights of flour in the Red River, of which I gave him but little hope; but, through his persuasion and popularity, he gained his desire, and succeeded in getting the full supply when most others would have failed. He had with him his faithful catechist, Luke Caldwell, and a crew from his own people at Fairford. He is happy with them, and they with him; and I was glad to meet them all, and spend with them a portion of a day."—Journal Letter from the Bishop of Rupert's Land, *Church Missionary Record*, Feb. 1860.

"With this measure of apparent outward strength there are some causes and hindrances which, I think you will agree with me, tend to cripple and retard our work.

"There is the very migratory character of our most settled population. This may, in the good providence of God, carry onward the tide of population and scatter it over the wilderness. It may thus ultimately answer a good purpose; but its tendency at the time is felt by most of us very painfully. It weakens parishes and very materially checks education, rendering it more expensive and difficult to be extended to all. It keeps the mass in a state of greater poverty, and prevents their growth and rise. It lessens the amount of public spirit and local attachment, and perpetuates many of the habits of Indian life. It parts and separates, where, if united, all would be combination and strength.

"There is, too, the want of a deeper religious life, even amongst the more advanced Christians. Here there is stagnation instead of movement. The Word is heard with joy and received with readiness; but it is the development of the rich fruit which the minister looks for, and looks too often in vain. Measuring themselves rather by that from which God hath saved them—the condition of the heathen who know not God—than by the standard of by-gone generations and of other countries, they are satisfied with smaller attainments; they rest contented with a lower level, and do not press forward to the measure of the stature of a perfect man. Their condition is a matter of rejoicing to the minister of God at first, as they are eager to hear. It is in their after-course that he suffers disappointment. The building stops before he is prepared; the growth terminates suddenly, after advancing for a time with rapidity, and there is not the higher experience of the divine life.

"There is, morever, an additional check in the Indian work. It is a transition period; change is anticipated. An excitement has seized the Indian mind, and he is little inclined to give a calm and patient attention to the claims of the Gospel. A wider competition is afloat, and baits are held out by the unscrupulous which the poor Indian is too weak to resist. A greater difficulty has thus been found in selecting and planting new stations, while at the old-established missions the steadfastness of the convert has been very sorely tried, if not, in some cases, too successfully shaken. Direct conversions have in consequence been less numerous during the last two years, and I much fear that the next two or three may continue to tell the same tale. At all events, the Indian is less hopeful, and more difficult to act upon, than he was found to be five years ago.

"With these and other causes impeding the progress of our work, and materially affecting its character, the testimony of all of us would, if I mistake not, be somewhat similar to-day; our common acknowledgment would be, that the interval since we last met has not been marked with such distinct success as previous periods; that some of our more sanguine expectations have only been faintly realized. Now, if such be your feelings, brethren, is there no deeper agency to which we may trace this?

Is the condition peculiar to ourselves, or may we throw it under a wider classification, and identify it with what we notice elsewhere on a wider scale? The answer to my own mind is sufficiently clear; the explanation which alone appears to me to account for it, is a greater measure of power put forth by Satan in the days in which we live, not only here but over the whole earth. Can we, then, substantiate this in the world, so as to prove it more than an idle dream?"

The *Fort Garry Nor'-Wester* of January 14th, 1860, in a report of a meeting held at St. John's school-house, Red River, states that the Earl of Southesk, who had just returned from a hunting expedition to the Rocky Mountains, informed the meeting that when in the immediate neighbourhood of that distant mountain region, he fell in with about twelve families of Assinniboine Indians who professed Christianity, and, so far as he could judge, were acting up to their profession. These families were remote from any missionary station, and had not even seen a missionary for many years. Still they showed considerable acquaintance with the Scriptures, and were regular in their morning and evening devotions. A little bell was always rung as their signal for assembling to worship, and the singing of hymns formed part of their religious exercises. At their earnest request his lordship wrote out for them several passages of Scripture. Their knowledge of religion is supposed to have been imparted to them by Rev. Mr. Randall, a Wesleyan Missionary, who went to Fort Edmonton in 1839, and left the country in 1847, on account of ill-health. They have, however, a regular teacher in one of themselves, who has been set apart by them for that purpose.

This is truly the "Church in the wilderness," not unfrequently represented, however humbly, in the prairies of the far West or the illimitable wastes of Rupert's Land, where Christian Indian hunters, when they meet together, often celebrate divine service after their own fashion, meekly repeating the prayers and hymns they have learned from the missionaries. A Plain Cree on the Qu'appelle once astonished me by producing a short notched stick, and after regarding it for a while, he turned to one of my half-breeds and asked if the day was not Sunday. The seed which has been sown, often starts into life after lying dormant for years, and produces a great variety of fruit. It is "bread cast upon the waters, which will be found after many days."

CHAP. XXXIII.

THE HUDSON'S BAY COMPANY.

Incorporation of the Hudson's Bay Company. — Profits of the Company. — The North-West Company of Montreal. — Union of the two Companies. — Profits of the Hudson's Bay Company after the Union. — Proprietors and Stock of the Company.—Administration of their Affairs.—Sir George Simpson. — The Council. — Departments, Districts, and Posts. — Extent of the Administration of the Company for the prosecution of the Fur Trade.

The Hudson's Bay Company was incorporated in the year 1670, under a royal charter of Charles the Second, which granted them certain territories in North America, together with exclusive privileges of trade and other rights and advantages. During the first twenty years of their existence the profits of the Company were so great * that, notwithstanding considerable losses sustained by the capture of some of their establishments by the French, amounting in value to 118,014*l.*, they were enabled to make a payment to the proprietors in 1684 of fifty per cent., another payment in 1688 of fifty per cent., and a farther payment in 1689 of twenty-five per cent.

In 1690 the stock was trebled without any call being made, besides affording a payment to the proprietors of twenty-five per cent. on the increased or newly created stock; from 1692 to 1697 the Company incurred loss and damage to the amount of 97,500*l.* sterling from the

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* See Letter from the Governor of the Hudson's Bay Company to the Lords of the Committee of Privy Council for Trade, February 7th, 1838.

French. In 1720 their circumstances were so far improved that they again trebled their capital stock, with only a call of ten per cent. from the proprietors, on which they paid dividends averaging nine per cent. for many years, showing profits on the originally subscribed capital stock actually paid up of between sixty and seventy per cent. per annum from the year 1690 to 1800, or during a period of 110 years.

Up to this time the Hudson's Bay Company enjoyed a monopoly of the fur trade, and reaped a rich harvest of wealth and influence.

In 1783 the North-West Company was formed, having its head-quarters at Montreal. The North-West Company soon rose to the position of a formidable rival to the Hudson's Bay Company, and the territory the two companies traded in became the scene of animosities, feuds, and bloodshed, involving the destruction of property, the demoralization of the Indians, and the ruin of the fur trade. Owing to this opposition, the interest of the Hudson's Bay Company suffered to such an extent, that between 1800 and 1821, a period of twenty-two years, their dividends were, for the first eight years, reduced to four per cent., during the next six years they could pay no dividend at all, and for the remaining eight years they could pay only four per cent.

In the year 1821 a union between the North-West and Hudson's Bay Companies took place, under the title of the last named. The proprietary were called upon to pay 100*l.* per cent. upon their capital, which, with the stock in trade of both parties in the country, formed a capital stock of 400,000*l.*, on which four per cent. dividend was paid in the years 1821 to 1824, and from that time half yearly dividends of five per cent. to 1828, from 1828 to 1832 a dividend of five per cent., with a bonus of ten per cent. was paid, and from 1832 to 1837 a dividend of five per cent., with an average bonus of six per cent. The distribution of profits to the shareholders for the years 1847 to 1856, both inclusive, was as follows:—

1847—1849, ten per cent. per annum; 1850, twenty per cent. per annum, of which ten per cent. was added to stock; 1851, ten per cent.; 1852, fifteen per cent., of which five per cent. was added to stock; 1853, 18*l.* 4*s.* 6*d.*, of which 8*l.* 4*s.* 6*d.* was added to stock; 1854 to 1856, ten per cent. per annum dividend.* Of 268 proprietors in July 1856, 196 have purchased their stock at from 220 to 240 per cent.†

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* Letter from R. G. Smith, Esq., Secretary to the Hudson's Bay Company, to H. Merivale, Esq.—*Appendix to Report from the Select Committee on the Hudson's Bay Company.*

† The capital employed by the Hudson's Bay Company is as follows:—

June 1st 1856.

	£	s.	d.
Amount of assets	1,468,301	16	3
Amount of liabilities	203,233	16	11
Capital	1,265,067	19	4

Consisting of,	£	s.	d.
Stock, standing in the names of the proprietors	500,000	0	0
Valuation of the Company's lands and buildings, exclusive of Vancouver's Island and Oregon	318,884	12	8
Amount expended up to 16th September 1856, in sending miners and labourers to Vancouver's Island, in the coal mines, and other objects of colonization, exclusive of the trading establishments of the Company, and which amount will be repayable by Government if possession of the island is resumed	87,071	8	3
Amount invested in Fort Victoria and other establishments and posts in Vancouver's Island, estimated at	75,000	0	0
Amount paid to the Earl of Selkirk for Red River Settlement	84,111	18	5
Carried forward	1,065,067	19	4

The affairs of the Hudson's Bay Company are managed by a Governor-in-chief, sixteen chief factors, twenty-nine chief traders, five surgeons, eighty-seven clerks, sixty-seven postmasters, twelve hundred permanent servants, and five hundred voyageurs, besides temporary employés of different ranks, chiefly consisting of voyageurs and servants. The total number of persons in the employ of the Hudson's Bay Company is about 3000.

Sir George Simpson has been Governor of the Hudson's Bay Company for forty years. He exercises a general supervision over the Company's affairs, presides at their councils in the country, and has the principal direction of the whole interior management in North America. The Governor is assisted by a council for each of the two departments into which the territory is divided.

The seat of council for the northern department is at Norway House, on Lake Winnipeg; for the southern department at Michipicoten, Lake Superior, or Moose Factory, on James' Bay.

The council consists of the chief officers of the Company, the chief factors being ex-officio members of council. Their deliberations are conducted in private. The sixteen chief factors are in charge of different districts in the territory, and a certain number of them assemble every year at Norway House, for the northern department, generally about the middle of June, to meet the Governor and transact business. Seven chief factors, with the

	£	*s.*	*d.*
Brought forward	1,065,067	19	4
Property and investments in the territory of Oregon, ceded to the United States by the treaty of 1846, and which are secured to the Company as possessory rights under that treaty—$1,000,000 sterling	200,000	0	0
Total .	£1,265,067	19	4

Governor, form a quorum, but if a sufficient number of the higher rank of officers are not present, a quorum is established by the admission of chief traders.

The Hudson's Bay Company's operations extend not only over that part of North America called Rupert's Land and the Indian territory, but also over part of Canada, Newfoundland, Oregon, Russian America, and the Sandwich Isles. The following table exhibits the number of departments and district posts into which this immense territory is divided for the prosecution of the fur trade:—

Country.	Departments.	Districts.	No. of Posts.
Part of Indian territory and part of Rupert's Land.	Northern.	Athabaska	4
		McKenzie River	11
		English River	5
		Saskatchewan	9
		Cumberland	3
		Swan River	6
		Red River	6
		Lac la Pluie	7
		Norway House	3
		York	5
Part of Rupert's Land, and Canada.	Southern.	Albany	4
		Kmogumisse	2
		Lake Superior	9
		Lake Huron	5
		Sault St. Marie	1
		Moose	4
		East Main	3
		Rupert's River	8
		Temiscamingue	6
Newfoundland and part of Rupert's Land.	Montreal.	Fort Coulonge	3
		Lac des Sables	2
		Lacluire	1
		St. Maurice	3
		King's Posts	6
		Mingan	3
		Esquimaux Bay	4
Part of Indian territory, Washington territory, U.S. and Oregon, U.S.	Oregon.	Columbia	8
		Colville	5
		Snake Country	3
Vancouver's Island, part of Indian territory and Russian America.	Western	Vancouver's Island	3
		North-West Coast	1
		Thompson's River	1
		New Caledonia	8
3 Independent Countries.	5 Depmts.	33 Districts.	152 Posts.

From the foregoing table it appears that the operations of the Hudson's Bay Company extend over territories whose inhabitants owe allegiance to three different and independent governments, British, Russian, and the United States. These immense territories, exceeding 4,500,000 square miles in area, are divided, for the exclusive purposes of the fur trade, into four departments and thirty-three districts, in which are included one hundred and fifty-two posts, commanding the services of three thousand agents, traders, voyageurs, and servants, besides giving occasional or constant employment to about one hundred thousand savage Indian hunters. Armed vessels, both sailing and steam, are employed on the North-West Coast to carry on the fur trade with the warlike natives of that distant region. More than twenty years ago the trade of the North-West Coast gave employment to about one thousand men, occupying twenty-one permanent establishments, or engaged in navigating five armed sailing vessels, and one armed steamer, varying from one hundred to three hundred tons in burden. History does not furnish another example of an association of private individuals exerting a powerful influence over so large an extent of the earth's surface, and administering their affairs with such consummate skill and unwavering devotion to the original objects of their incorporation.

CHAP. XXXIV.

THE COMMUNICATION BETWEEN CANADA AND RED RIVER.

The Winter Communication.—Character of the Country on the North Shores of Lakes Huron and Superior.—Probabilities of a Road being made. Country north of Lake Huron. — Mr. Salter's Survey.—Mr. Murray's Survey.——The Summer Communication. — Route proposed by Mr. Dawson.—The Pigeon River Route.—The Old North-West Company's Route.—Cost of improving and opening the Fort William and Arrow Lake Route.—— Communication viâ the United States. — Arrangement of the Hudson's Bay Company. — Arrangement of Messrs. Burbank and Company.—Captain Palliser's Opinion respecting the Canadian and American Routes. — Objections to his View. — Advantages of the Pigeon River Route.

WINTER COMMUNICATION.

A road between Canada and Red River through British territory is at present impracticable for commercial purposes during the winter season, that is, from November to April, both inclusive. A rocky wilderness, almost destitute of civilized inhabitants, and throughout a considerable part of its area not susceptible of cultivation, extends from the 79th to the 96th meridian. The shortest line of road from the limits of settlement in western Canada *viâ* the north shores of Lakes Huron and Superior, to the north corner of the Lake of the Woods exceeds 1000 miles in length, and would traverse a region where the mean winter temperature does not rise higher than fifteen degrees above zero. When the mineral wealth of the northern shores of Lakes Huron and Superior forms the basis of speculative enterprize on an enlarged scale, a winter communication with those regions will become a necessity, and may ultimately extend westward to Red River. It is not improbable that circumstances now dimly foreseen may expedite the opening of this communication, and make it a matter not only of colonial but also of imperial interest.

The first step towards bridging this wilderness was proposed in 1856, when a bill passed the Canadian House of Assembly incorporating the "North Shore and Quebec Railway Company, and granting 4,000,000 acres of land to the company along the line of route. In May 1860 an act was passed incorporating the "Central Canada Railway Company," which included the North Shore and Quebec Railway within its provisions, no steps having been taken towards commencing that work.

Since the time when the north shore of Lake Huron attracted public attention on account of its mineral wealth, it has been the general custom to draw conclusions respecting the features of the country in the interior from the aspect of the coast, and to predicate a condition of soil and climate, wholly at variance with the facts which have been recently established. Not only did Mr. Salter, who was employed to survey the interior north and north-east of St. Mary's River, find very entensive areas of excellent land covered with a fine forest growth of hard wood trees, but Mr. Murray, of the Canadian Geological Survey, has drawn special attention to the geographical characteristics of a large area in the region indicated. Mr. Murray says*, "It has been remarked in former reports that the north coast of Lake Huron, in many parts picturesque, appears too rocky near the margin to be suited for agricultural settlement, though likely in time to become of importance to the province by the development of the metalliferous ores which the geological formation of the region is known to contain. But while this description is applicable to the coast line and the margin of some of the rivers and larger lakes of the interior, it is by no means so to the country in general. On the contrary, there are in many parts, especially in the valleys of the Thessalon and its tributaries, extensive tracts of the finest lands, covered with a luxuriant growth of hard wood interspersed with stately pine trees, probably equal in average size to any of the same species known in the province."

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* Geological Survey of Canada, Report of Progress for the Year 1858.

The interior of the country north of Lake Superior is now being surveyed for the purpose of laying off mining locations; its extraordinary mineral wealth cannot fail to draw a large mining population, which will cause the agricultural lands in the valleys of the rivers to be sought after; the fisheries are also of great importance. Under these favourable circumstances there is every probability that the country north of Lakes Huron and Superior will speedily grow in importance, and the day is not far distant when uninterrupted communication with the north-western Railroad termini in Canada will be established during the winter months.

THE SUMMER COMMUNICATION.

The opening of a summer communication between Lake Superior and Red River was one of the objects which the Canadian Government had in view in exploring the route. The duty of continuing the examination of the country in 1858, and reporting on the best means of traversing it, was confided to Mr. Simon Dawson.

The following extract from his report will explain the manner in which he proposes to open the communication by carts, boats, and steamers: —

	Land carriage miles.	Navigable miles.
"From Thunder Bay to Dog Lake	28	
Through Dog Lake and River to the Prairie Portage		35
Land road past Prairie and Savanne Portages to Savanne River	5	
Through Savanne River, Lac des Mille Lacs, and the River Seine to the Little Falls . . .		65
Broken navigation on River Seine		59½
Land carriage past the twelve portages on River Seine	7	
From the Seine to the western extremity of Lac Plat, navigable with only one break at Fort Frances .		208
Thence to Fort Garry by land	91½	
Total	131½	367½

"The foregoing does not represent the distance in a direct line, but the extent to be traveled, making allowance for the tortuosities of the route.

"In regard to the means of transport which could be most economically and advantageously used: —

"Waggons or carts would be required on the road between Thunder Bay and Dog Lake.

"On Dog Lake and River boats, such as already referred to as being used by the Hudson's Bay Company, or even a steamer might be employed.

"At the Prairie Portage, carts or waggons would be necessary.

"On the Savanne River, Lac des Mille Lacs, and the River Seine, as far as the Little Falls, after the dam was constructed at the last-mentioned place, there would be an unbroken reach of 65 miles, and on this section it would be advantageous to have a small steamer.

"On the 59½ miles of broken navigation, on the River Seine, between the Little Falls and the twelve portages, boats, as already explained, should be used, while at the land road past the twelve portages, carts or waggons, as on the other sections of road, would be necessary.

"From the River Seine to Fort Frances, a steamer would have a clear run of 50 miles.

"From Fort Frances to Lac Plat, steamers would have an uninterrupted run of 158 miles.

"From the latter place to Fort Garry no provision would have to be made, as the means of transport are to be had in abundance at the Red River Settlement.

"If the communication were opened in the manner above set forth, the journey from Lake Superior to Red River might be performed in about three days, that is, allowing that steamers could be maintained at an average speed of ten miles an hour on the navigable reaches, that the land roads might be passed over at the rate of five miles an hour, and that the interrupted navigation of the Seine could be accomplished at the rate of four miles an hour."*

* * * * * * * *

"According to a rough estimate which I have made, the total cost of opening the communication in the manner which I propose, would not exceed 50,000*l.*, but until the surveys now in progress are completed, and the necessary measurements taken, it is impossible for me to submit a very precise estimate in detail."†

The "Pigeon River route," commonly called the old North-West Company's route, along the Boundary Line, appears to possess many advantages over the Kaministiquia route, or that suggested by Mr. Dawson, *viâ* the river Seine. The objection to which it is supposed to be open in consequence of its lying along the course of the Boundary Line, applies with equal force to the other routes from Rainy Lake to the Lake of the Woods. As yet no route has been surveyed, or is known to exist within British territory, lying altogether north of the Boundary Line. A road fulfilling that condition would have to pass north of the deep indents of Rainy Lake, and cross the Winnipeg at Rat Portage, traversing a region of country through which there is no known water communication, and crossing the rivers, west of the most easterly northern prolongation of Rainy Lake, at right angles, or nearly so, to their directions, and consequently to the ranges of granitic or gneissoid hills which determine the river courses.

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* Mr. Dawson's estimate of the time required to make the journey from Lake Superior to Red River (three days) is evidently much too low; since it would be impossible for steamers to travel 10 miles an hour at night on unlighted and often intricate waters. Three miles an hour on such roads as could be constructed with a limited outlay in that broken country would be fully as much as could be accomplished. Mr. Dawson makes no allowance for steamers taking in a supply of fuel, or for the transhipment of cargo; and no time is allowed for men or horses to take meals, or rest on the roads. The uninterrupted speed assumed involves numerous relays, and a system of organization which could not be maintained without enormous outlay.

† Report on the exploration of the country between Lake Superior and the Red River Settlement, and between the latter place and the Assinniboine and Saskatchewan, by S. J. Dawson, Esq., C.E. Toronto, 1859.

The North-West Company cut out a cart road between Point des Meurons, nine miles from Fort William, and Whitefish Lake, lying to the north-east of Arrow Lake, from which it is separated by a portage. This road and all old portage paths require to be cleared, and tramways laid down, over which loaded boats may be hauled by appropriate tackle. The portages on this route are low and short, and might be rendered passable in the manner suggested for a small outlay. The height of land, although more elevated than the Savanne Portage, is nearly one degree further south, and the country through which the route lies is well timbered. Whatever route may be ultimately adopted between Lake Superior and Rainy Lake, steamers must be placed on Rainy River, and a road constructed through the swamps west of the Lake of the Woods to Red River. When these works are completed, the summer communication between Lake Superior and Red River, *viâ* Arrow Lake, will be accomplished within six days, which will bring Fort Garry within twenty-two days of Liverpool.

The cost of improving and opening what may be termed the Fort William and Arrow Lake route to fulfil these conditions, does not exceed 12,000*l.*; the details of this estimate are given in the Appendix. The proposed route involves the following modes of traveling :—

1. Fort William to Arrow Lake by waggon road.
2. Arrow Lake to Rainy Lake by boat of five or six tons or more, crossing the portages on tramways without unloading.
3. Rainy Lake to the Lake of the Woods by steamer with one transhipment at Fort Frances, until the construction of two locks of ten feet lift, and one guard lock, are made to overcome the Chaudière Falls.
4. The North-West corner of the Lake of the Woods to Fort Garry by road.

The Canadian Government have placed the sum of $20,000 per annum, for five years, at the disposal of the

North-West Transit Company, on certain conditions, for the purpose of opening the communication between Lake Superior and Red River. It is not yet determined whether the Company will adopt the route by Mille Lacs and the Seine or the Fort William and Arrow Lake route.

COMMUNICATION WITH THE UNITED STATES.

The summer and winter routes between Fort Garry and Crow Wing are described in preceding chapters. As the importance of this communication progresses the journey will be made with horses and stage coach throughout the winter months by the summer road. During the period of navigation the distance between St. Paul, the present head of navigation on the Mississippi, and Fort Garry, is accomplished in nine days; six days being required to travel from St. Paul to Georgetown, on Red River, by stage coaches, and three days by steamer from Georgetown to Fort Garry. Mr. Burbank's complement of 100 waggons, in brigades of twenty-five each, are now running from St. Paul to Georgetown, conveying the freight of the Hon. Hudson's Bay Company, for which service Mr. Burbank has a contract for five years, whereby he is bound to carry 500 tons annually for that period. The Hudson's Bay Company have relinquished their northern route *viâ* Hudson's Bay, York Factory, and Lake Winnipeg, and adopted the route through the United States, *viâ* St. Paul and Georgetown on Red River to Fort Garry.*

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* "On the first day of June next (1860) a new era will open for St. Paul and the north-west. On that day will commence the regular trips of Burbank and Co.'s express, coach, waggon, and steamboat lines between St. Paul and Fort Garry on the Red River of the north, in the Hudson's Bay territory, for the year 1860.

"The first experiment in far north-western passenger and freight transportation was made by Burbank and Co. last year, the result of which is, that

Messrs. Burbank and Co. now undertake the transportation of goods from England or Canada, in bond, collecting all charges on delivery of the goods at Fort Garry; and persons desiring to order goods from England immediately, can have the same forwarded from Liverpool by Allan Brothers and Co., care of J. C. and H. C. Burbank (in bond), St. Paul.

In July 1858, Capt. Palliser was requested by the Under Secretary for the Colonies to state his opinion on four points connected with the country he was engaged in exploring. These were —

"1st. Whether Red River Settlement possesses qualifications which would adapt it for an English colony.

"2nd. What should be the dimensions and the boundary line of such colony, and whether it would be advisable to include the Saskatchewan district in it, so as to establish one great border line from the new colony of British Columbia up to the Red River Settlement, under

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they have this year on the line from here to Selkirk settlement, appointments sufficient to meet the demands of the Hudson's Bay territory and intermediate country.

"On that portion of the line, from St. Cloud, seventy-five miles above this city, on the Mississippi, to Georgetown, three hundred miles further northwest, on Red River, they will have on and after the first of June, fifteen four horse Concord coaches, making, regularly, tri-weekly trips, and one hundred transportation waggons. The waggons are divided into four brigades of twenty-five each. The whole line will be organized and conducted with military precision. One brigade, commanded by a captain, will leave St. Cloud every week, and another returning, will leave Georgetown. From that point the steamer will connect with Fort Garry, in the Selkirk settlement of the Hudson's Bay territory."—*St. Paul Pioneer,* May 11th.

"The Anson Northup returned to Fort Garry on Monday morning, having made the round trip between this and Georgetown in a little over seven days — the fastest time on record! When she left Georgetown, on Saturday morning last, the heavy teams had not yet come up, the badness of the roads, owing to continuous rains, having kept them back beyond their usual time. Several teams with freight were, however, within a day's journey of Georgetown; but the boat having to make good the time lost on the previous trip, at once returned. Her cargo consisted of 100 kegs of gunpowder, for the Hudson's Bay Company; 21 bales of clothing, for the Royal Canadian Rifles, &c."—*Nor'-Wester,* Fort Garry, June 20th, 1860.

> a sway and jurisdiction distinct from the Hudson's Bay Company's authority.
>
> "3rd. What means of access exist for British emigrants to reach this settlement.
>
> "4th. Whether, judging from the explorations you have already made, the country presents such facilities for the construction of a railway as would at some period, though possibly a remote one, encourage her Majesty's Government in the belief that such an undertaking between the Atlantic and the Pacific Ocean could ever be accomplished."

In answer to the third query, viz. "What means of access exist for British immigrants to reach this settlement," Captain Palliser says, "I think there are no means of access to be recommended save those *viâ* the United States."

"The direct route from England *viâ* York Factory, and also that from Canada *viâ* Lake Superior, are too tedious, difficult, and expensive for the generality of settlers. The manner in which natural obstacles have isolated the country from all other British possessions in the East is a matter of considerable weight; indeed, it is *the* obstacle of the country, and one, I fear, almost beyond the remedies of art. The egress and ingress to the settlement from the East is obviously by the Red River Valley and through the States."

Captain Palliser has not had the opportunity of examining and reporting on the Fort William and Arrow Lake route from Lake Superior to Red River. Practical experience of the facilities offered by that route would, I venture to say, have greatly modified the sweeping condemnation of existing and possible means of communication comprehended in the foregoing brief reply to the important question proposed by the Colonial Office. It is a question of great moment to the future colony in the Basin of Lake Winnipeg, of vast importance to Canada, and in view of the extraordinary gold-wealth of British

Columbia, of paramount interest to the Imperial Government, if British laws, institutions, and civilization are to stretch across the American continent, and connect the eastern with the western hemisphere. As an emigrant route, the outlay of a few thousand pounds can make it available for summer communication. An emigrant could then start from Liverpool and proceed to Quebec by steam (eleven days), from Quebec to Collingwood, Lake Huron, by rail (two days), from Collingwood to Fort William by steamer (three days), and from Fort William to Fort Garry *viâ* Arrow Lake and the Boundary Line (six days), or twenty-two days in all from Liverpool to Selkirk Settlement. The route through the United States, *viâ* St. Paul, cannot offer greater advantages as a summer emigrant route than those presented by the Chain of Lakes* along the Boundary Line to the north-west corner of the Lake of the Woods, if improved and served in accordance with the suggestions contained in the Appendix to this volume.† Cattle and live stock generally, will necessarily pass to and from the United States over the prairies of Red River, where food is abundant, and can be obtained without cost, but there is no reason why heavy goods should not in process of time be shipped at Liverpool and proceed direct to Fort William on Lake Superior without transhipment, passing through the magnificent chain of Canadian canals, enumerated on page 16 of the first volume, and thence to Red River, through British territory *viâ* Arrow Lake, Rainy River, and the north-west corner of the Lake of the Woods.

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* See profile of the Chain of Lakes on the Old North-West Company's, or the Pigeon River route, according to Mr. Dawson's survey; also plan of the route published in the Blue Book, August, 1860.

† Remarks on the Pigeon River route, with an estimate of the cost of opening the communication from Fort William to Fort Garry. Appendix, Vol. II. No. 12.

CHAP. XXXV.

THE COMMUNICATION BETWEEN RED RIVER AND THE PACIFIC. —THE IMPORTANCE OF THE BASIN OF LAKE WINNIPEG.

The Result of Captain Palliser's Expedition. — Valley of the Saskatchewan. —Character of the Valley. — The Rocky Mountain Passes.—Route across the Continent.—Lieutenant Palmer's Explorations in British Columbia.—Roads in British Columbia.—Lieutenant Richard Mayne's Explorations in British Columbia.—Thompson River.—Present position of British Columbia. — The Customs and Imports of the Colony. — The Gold Fields. —Their extent. — Captain Palliser's suggested Boundary of the New Colony in the Basin of Lake Winnipeg. — Objections to this Boundary. —Importance of the New Colony being conterminous with Canada on the East. — The Natural Boundary of the New Colony. — Importance of the East Coast of Lake Winnipeg.—Necessity for a Natural Northern Boundary.—Suggested Boundary. — THE NATURAL ADVANTAGES OF THE BASIN OF LAKE WINNIPEG.—The Great American Desert.—The FERTILE BELT in the Basin of Lake Winnipeg. — Its Importance. — Its Natural Resources.— Conclusion.

FORT GARRY, RED RIVER TO THE ROCKY MOUNTAINS, THENCE TO THE PACIFIC.

IN the Blue Book recently published *, Capt. Palliser enumerates the result of the explorations of the expedition under his command across the continent, and states that his endeavours, in conjunction with Mr. Sullivan, "to find a route practicable for horses from Edmonton westward across the Rocky Mountains, as far as the longitude of Fort Colvile, and entirely within British territory, have been perfectly successful." In addition to this, Capt. Palliser pursued his way for more than fifty miles to the

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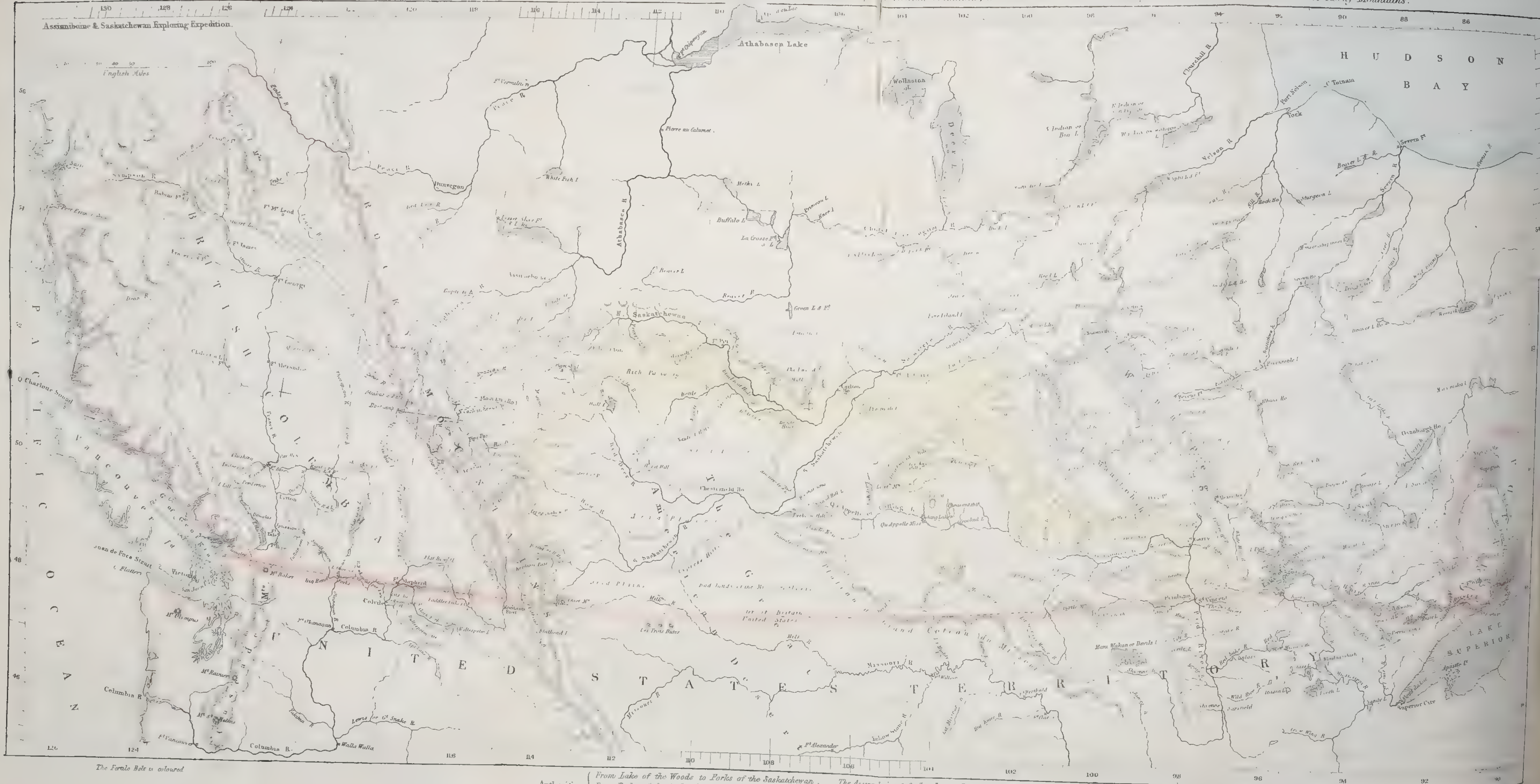
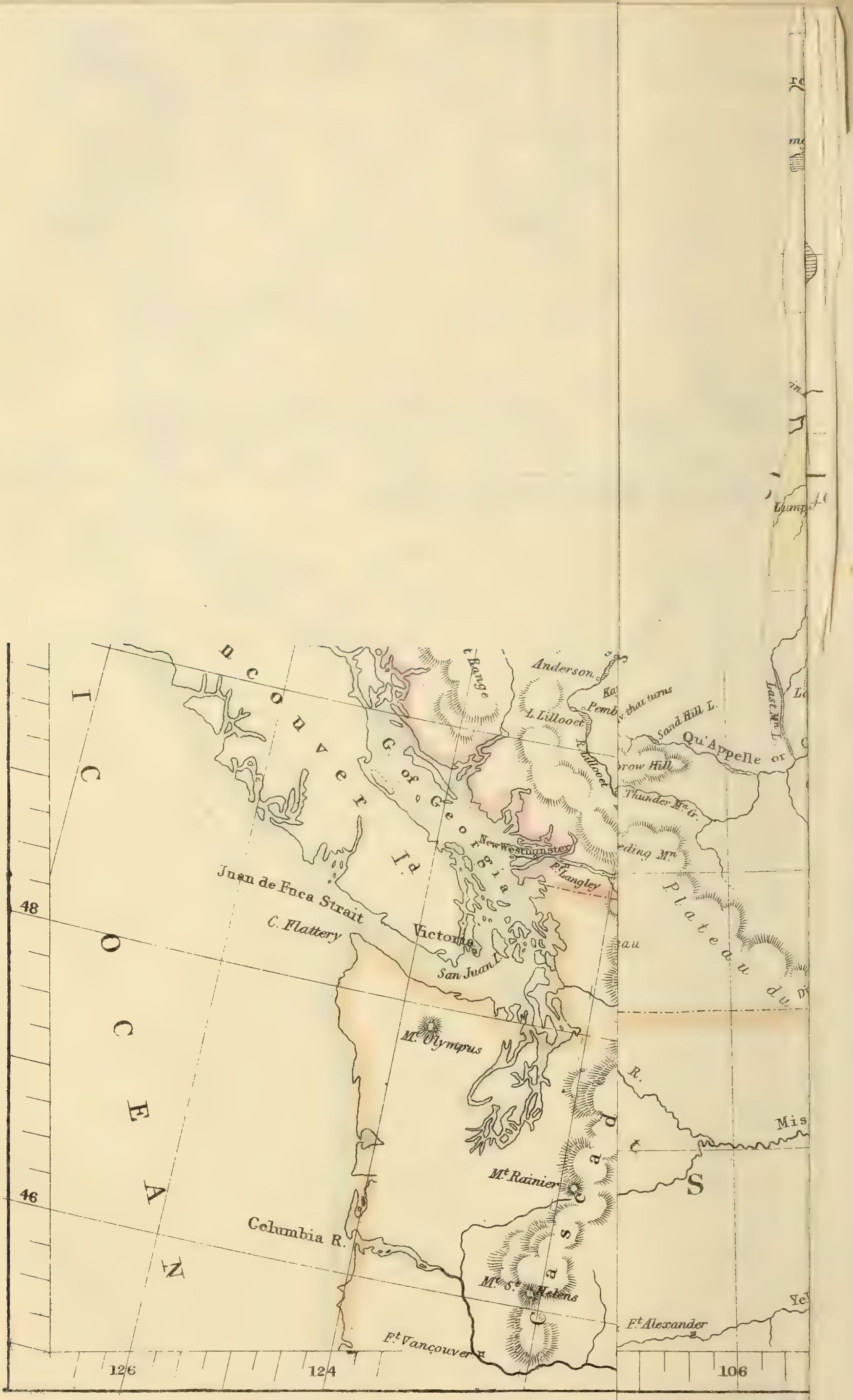
* Papers relative to the Exploration of British North America, August 18th, 1860.

Map of the Country from LAKE SUPERIOR to the PACIFIC OCEAN, *showing the Western Boundary of Canada & the Eastern Boundary of British Columbia, also the* Fertile Belt *stretching from the Lake of the Woods to the Rocky Mountains.*



The Fertile Belt is coloured

Authorities	
From Lake of the Woods to Forks of the Saskatchewan	*The Assiniboine & Saskatchewan Expedition*
From Forks of the Saskatchewan to the Rocky Mountains	*Captn Palliser's Expedition*
British Columbia	*Blue Book. Augt 1860*



The Fertile Belt is coloured . . ⬚

wan ...... The Assinnil

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...... Blue Book

westward, still north of the 49th parallel, until he arrived at the camp of the United States Boundary Commissioners in longitude 119° 30′ west.

Captain Palliser describes the region drained by the Saskatchewan in the following words*:—

"The extent of surface drained by the Saskatchewan, and other tributaries to Lake Winnipeg, which we had an opportunity of examining, amounts in round numbers to 150,000 square miles. This region is bounded to the north by what is known as the 'strong woods,' or the southern limit of the great circum-arctic zone of forest, which occupies these latitudes in the northern hemisphere. This line, which is indicated in the map, sweeps to the north-west from the shore of Lake Winnipeg, and reaches its most northerly limit about 54° 30′ N., and longitude 119° W., from where it again passes to south-west, meeting the Rocky Mountains in latitude 51° N., longitude 115° W. Between this line of the 'strong woods' and the northern limit of the true prairie country there is a belt of land varying in width, which at one period must have been covered by an extension of the northern forests, but which has been gradually cleared by successive fires.

"It is now a partially wooded country, abounding in lakes and rich natural pasturage, in some parts rivaling the finest park scenery of our own country. Throughout this region of country the climate seems to preserve the same character, although it passes through very different latitudes, its form being doubtless determined by the curves of the isothermal line. Its superficial extent embraces about 65,000 square miles, of which more than one-third may be considered as at once available for the purposes of the agriculturist. Its elevation increases from 700 to 4000 feet as we approach the Rocky Mountains, consequently it is not equally adapted throughout to the cultivation of any one crop, nevertheless at Fort Edmonton, which has an altitude of 3000 feet, even wheat is sometimes cultivated with success.

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* Papers relative to the Exploration of British North America, Aug. 18th, 1860, page 21.

"The least valuable portion of the prairie country has an extent of about 80,000 square miles, and is that lying along the southern branch of the Saskatchewan, and southward from thence to the boundary line, while its northern limit is known in the Indian languages as 'the edge of the woods,' the original line of the woods before invaded by fire.

"On the western side of the Rocky Mountains, in the country which we examined, there were but few spots at all fitted for the agriculturist, and these form isolated patches in valleys separated by mountain ranges.

"As the next result of our explorations, I shall briefly mention the different passes through the Rocky Mountains which we explored, alluding to the chief advantages and disadvantages of each.

"The Kananaskis Pass and the British Kootanie Pass were examined by myself. Of these I consider the Kananaskis Pass the preferable one, both on account of its direct course through the mountains and its easier ascent.

"The ascent to the height of land from the east is through a wide gently sloping valley, and the immediate watershed is formed by a narrow ridge, which, if pierced by a short tunnel, would reduce the summit level to about 4600 feet above the sea. The descent to the west, into which Kananaskis Pass opens, is comparatively easy.

"The British Kootanie Pass also opens out into the Kootanie River valley, but the altitude here to be overcome is much greater, amounting to 6000 feet. There are likewise two ridges to be passed, which fact would form a very strong objection to this pass.

"The Vermilion Pass, which was traversed by Dr. Hector, presents on a whole the greatest natural facilities for crossing the mountains without the aid of engineering work, as the rise to the height of land is gradual from both sides, a feature which seems to be peculiar to this pass. It would thus be impossible to diminish its summit level (which is less than 5000 feet), as is proposed in the case of Kananaskis Pass, but on the other hand it would be the most suitable for the construction of an *easy waggon road.*

"This, like the other two passes I have mentioned, also strikes the Kootanie River close to its source; but last summer Dr. Hector crossed the mountains by another pass from the head of the north branch of the Saskatchewan, directly to the Columbia River, in the vicinity of the boat encampment.

* * * * * *

"Although I consider this fact established, viz., that a line for a route has been discovered from Red River Settlement to the west coast of the continent, and that line moreover entirely within British territory, yet I wish distinctly to be understood that I think it far from being the best that could be discovered. Time did not admit of a series of attempts in a more northerly direction.

"Dr. Hector's explorations, when within sixty miles of his exit on Thompson's River, were prematurely closed by the advance of winter and the absence of provisions, while forcing his way through timber so thick that he could not penetrate faster than from three to four miles a day, and for a more detailed account of which I refer you to his report accompanying this letter."[*]

Lieutenant Palmer, R.E., explored the country between Fort Hope on the Fraser and Fort Colville on the Columbia River.[†] His report is not favourable for a road, although the physical impediments are not such as to be insurmountable.

Lieutenant Palmer states that "westward from the Similkameen valley[‡], and nearly to the coast, extends a mountain region, so rugged and bleak, and so inaccessible and devoid of roads of communication, that this valley is the first point east of the Sumas to which attention need be directed.

"It and the Okanagan valley are the main thoroughfares to British Columbia from Washington territory, and indeed east of them, as far as Fort Shepherd, the country affords no known practicable means of ingress.

The main route from Washington territory passes up the valley of the Okanagan River from its junction with the Columbia and forks at the mouth of the Similkameen whence branch the two routes already described.

* * * * *

"A great question now presents itself as to the means of communication between this district and the interior portions of British Columbia.

"Even if it be practicable at an enormous expense to construct a tolerable waggon road across Manson Mountain, or even should a better route be found by following round the valley of the Coquahalla, there still remains the dividing ridge of the Cascades, and the route would any way be impracticable for at least seven months in the year. Through Lytton, therefore, or the Kayoosh district, by the valleys of the Thompson and Bonaparte River to Nicolas Lake and Fort Kamloops, and thence to the border, all supplies must eventually pass, and hence the necessity of establishing good means of communication with these points from either the Fraser River or the sea."

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[*] Papers relative to the Exploration of British North America, Aug. 1860, p. 17.

[†] Papers relating to British Columbia, August, 1860.

[‡] The Similkameen rises a few miles north of the boundary-line, in long. 120° 40′; it flows into the Okanagan in long. 119° 30′, lat. 48° 56′.

"All the practicable means of access to British Columbia, except from the sea, strike the Fraser north of Fort Hope."

"In connexion with this subject it remains but for me to remark, that, from my own observation, and from information afforded me by Mr. M'Donald, I know a frontier road north of the 49th parallel to be practicable from the Similkameen, eastward to the N. Saa-app Lake in the N. Whoyalpitkwu Valley; and further that Captain Palliser's explorations have determined the possibility of extending such a road from that point to Fort Shepherd, though his report on the intervening tract cannot be pronounced as favourable as might be wished."

The communication through British territory between the Atlantic and Pacific has not been lost sight of by Governor Douglas.

His Excellency says, in the Blue Book before referred to (No. 26, Part. III.), "The great object of opening roads from the sea coast into the interior of the country, and from New Westminster to Burrard's Inlet and Pitt River, continues to claim a large share of my attention. The labour involved by these works is enormous; but so essential are they as a means of settling and developing the resources of the country, that their importance can hardly be overrated; and I therefore feel it incumbent on me to strain every nerve in forwarding the progress of undertakings so manifestly conducive to the prosperity of the colony, and which at the same time cannot fail ere long to produce a large increase in the public revenue."

"We hope to complete the last section of a pack-road leading by the left bank of the Fraser, from Derby (Fort Langley) to Lytton, a distance of 170 miles, on or before the 1st day of February next. From Lytton a natural road now exists leading to Red River settlement, by the Coutannais Pass, through the Rocky Mountains, and from thence following the valley of the Saskatchewan, chiefly over an open prairie country of great beauty, and replete with objects of interest to the tourist and the sportsman; a settler may then take his departure from Red River in spring with his cattle and stock, and reach British Columbia by that road in course of the autumn following. This is no mere theory, the experiment having been repeatedly made by parties of Red River people traveling to Colville, from whence there is a good road to Lytton; so much so, indeed, that one of those persons assured me that the whole distance from Lytton to Red River, with the exception of the Coutannais Pass, which is thickly wooded, may be safely travelled with carts. If the Canadian Government would undertake to open a road from Red River to the borders of Lake Superior, which really presents no very formidable difficulties, the connexion between British Columbia and Canada would be complete, and the whole distance might I think, be traveled on British soil."

The town of Lytton and the valley of Thompson River appear to be points of the greatest importance in British Columbia.

Lieutenant Richard Mayne conducted an exploration of the districts bordering on the Thompson, Fraser, and Harrison Rivers.* Lytton is at the Forks of the Thompson and Fraser Rivers, and contains eight or ten stores and a Government House. The Thompson River is about 150 yards wide at its mouth and there is a horse ferry established across it. Fort Kamloops is an important Post situated on the Forks of the Thompson and North Rivers; the Thompson is here 300 yards wide and the North River 320 yards. The head waters of the Thompson are about twenty-two miles east of these Forks and Dr. Hector advanced in 1859 from the east side of the Rocky Mountains within sixty miles of the source of the Thompson. He says that it was his wish "to follow the Columbia River down to its great bend at the boat encampment, and thence following up the valley of Canoe River endeavour to pass to the head waters of the Thompson River and so reach British Columbia." Want of provisions, the approach of winter, and the extraordinary thickness of the forest prevented Dr. Hector from accomplishing this very interesting link between the trails east of the Rocky Mountains and the head waters of the Thompson River; from which point a pack-road already exists to the Pacific considerably to the north of the Boundary Line.

The more or less speedy opening of a line of communication from the Atlantic to the Pacific through British territory, will be very largely dependent upon the progress of British Columbia. Enough is known respecting the prospects of that distant colony, to warrant the assumption that it will soon become a very wealthy and important British dependency. In the official documents recently published relative to the affairs of British Columbia†, a considerable amount of valuable information is contained, bearing upon the present prosperous state of the colony, the distribution of gold, and the existence of large areas of fertile soil fitted for cultivation.

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* Papers relative to British Columbia, Part III., Aug. 1860, p. 33.

† Further papers relative to the affairs of British Columbia, Part III. Presented to both Houses of Parliament by command of Her Majesty, August, 1860.

From the return of the value of imports and customs receipts at New Westminster for the twelve months ending 31st December, 1859, it appears that the imports amounted to 177,219*l.* 7*s.* 5*d.*, and the customs to 18,464*l.* The entire white population of British Columbia does not exceed 5000 men (Oct. 1859) with very few women and children. The value of the present export of gold (Oct. 1859) is estimated at 14,000*l.* a month or 168,000*l.* per annum.

The existence of gold in great abundance and over very wide areas in British Columbia, from the Rocky Mountains to the Pacific, and from the head waters of Fraser River to the Boundary Line, is well established; and "means of communication" embrace all that is required to make this distant colony one of the most important appendages of the British crown.

The second query submitted to Capt. Palliser by the Colonial Office elicited a reply which appears to be open to two serious objections.

"What should be the dimensions and the boundary line of such colony, and whether it would be advisable to include the Saskatchewan District in it, so as to establish one great border line from the new colony of British Columbia up to the Red River Settlement, under a sway and jurisdiction distinct from the Hudson's Bay Company's authority?" Capt. Palliser states in relation to the boundaries of the new colony:—

"If then the united territories of Red River, Swan River, and Saskatchewan, were adopted by Her Majesty's Government, I would suggest the following boundaries:—

"The southern boundary of the colony should be the

49th parallel of north latitude, commencing on east shore of the Lake of the Woods, to where it meets the crest of the Rocky Mountains in long. 115° W. The eastern boundary of the colony should be defined by a line commencing at the 49th parallel on the western shore of the Lake of the Woods, and following the western margin of that lake to the watercourse which unites the Lake of the Woods with Lake Winnipeg, from thence extending around the eastern shore of Lake Winnipeg, and following the watercourse of that lake to the 54th parallel of N. lat. in long. 98° W. The northern boundary of the colony might run from the above point of intersection along the parallel of 54° of N. lat. to the point where it intersects the crest of the Rocky Mountains in 118° of W. long. The whole would thus include a territory of 240,000 square miles."

The adoption of the eastern boundary described in the foregoing paragraph, would effectually isolate the colony from Canada, and interpose between the boundary of the two countries, a territory in the occupation of the Hudson's Bay Company, subject to their jurisdiction, and comprehending the narrow, but fertile valley of Rainy River, and the only practicable route known in British territory between Lake Superior and Red River. The boundary of Upper Canada is the height of land west of Lake Superior. The country drained by those rivers which flow into the St. Lawrence valley belongs to Canada; the country drained by those rivers which flow into Hudson's Bay, constitutes Rupert's Land, and is at present the hunting-ground of the Hudson's Bay Company. Captain Palliser's suggested boundary would leave the entire region between the height of land west of Lake Superior, and the western shore of the Lake of the Woods, nearly five degrees of longitude, in the occupation of the Company. The continuation of the eastern boundary from the outlet of Lake of the Woods, is proposed to be carried down the Winnipeg and along the east shore of that lake to the 54th parallel, in long. 98° W. By thus limiting the colony in an easterly direction, the valuable pine, spruce, minerals, and water-power of the east coast of Lake Winnipeg and of the Winnipeg River, would be legally cut off from the new colony, whose chief want will be timber for building purposes, and water-power to manufacture it on the spot. The jurisdiction of the new colony should manifestly extend over those parts of the country which, from their natural resources, will first attract a certain class of settlers. The lumberers on Lake Winnipeg will one day become relatively as important a body as the lumberers now are, on the Ottawa and the tributaries, to the St. Lawrence in Canada.

In order to secure to the new colony a route to the borders of Canada, and the valuable timber of the east coast of Lake Winnipeg and the affluents of the Winnipeg River, the eastern boundary line ought to be conterminous with that of Canada, as far as the north west corner of that province at the head waters of Neepigon and Firesteel Rivers, in long. 90° 25′, lat. 49° 15′ (approx.); and from this point it should follow the height of land between the Winnipeg Basin and Hudson's Bay, as far as the 54th parallel. The natural boundaries of the new colony might be very simply defined as, "the Basin of Lake Winnipeg north of the 49th parallel of latitude." This determination would give the following limits:—on the south, the 49th parallel from British Columbia to the Lake of the Woods, thence to Canada by the boundary line surveyed according to the treaty of Ghent. The west boundary of Canada stretches from the dividing ridge between South Lake and Gun Flint Lake, to the head waters of Neepigon and Fire-steel Rivers. This would form the eastern boundary of the new colony. From the head water of Fire-steel River, the north-east boundary might follow the dividing ridge between the Basin of Lake Winnipeg and Hudson's Bay, as far as Jack River, down which it should run to Play Green Lake. From this point the northern boundary would be very conveniently and naturally described as passing through, by the shortest course, the head waters of all the rivers flowing into Lake Winnipeg, the main Saskatchewan, and the North Branch of the Saskatchewan.

It is of great importance in an Indian and fur-trading country to possess a natural boundary. Indians and voyageurs can always understand the flow of waters and the term "dividing ridge," but of parallels of latitude they know absolutely nothing. The injunction not to hunt or trap beyond the dividing ridge would be understood by all, but an arbitrary boundary such as a parallel of latitude, might give rise to many disputes in the prosecution of the fur trade, which for some years to come will constitute the most important source of commerce and industry north of the basin of Lake Winnipeg.

THE NATURAL ADVANTAGES OF THE BASIN OF LAKE WINNIPEG FOR A ROUTE ACROSS THE CONTINENT.

It is impossible to examine a correct map of the North American continent without being impressed with the remarkable influence which the Great American Desert must exercise upon the future of the United States and British North America. The general character of this desert south of the 49th parallel is described elsewhere (Ch. XLI. p. 353; Appendix Vol. II. No. VII.), and the important fact has been noticed, that any railroad constructed within the limits of the United States must pass, for a distance of twelve hundred miles west of the Mississippi, through uncultivable land, or, in other words, a comparative desert. Along the 32nd parallel the breadth of this desert is least, and the detached areas of fertile soil greatest in quantity, but the aggregate number of square miles of cultivable land amounts only to 2300 in a distance of 1210 miles (Appendix No. VII.). The northern limit of the Great American Desert is an imaginary line drawn from the Touchwood Hills to the Moose Woods on the South Branch, then south of Battle River as far as long. 112°, when turning south it sweeps along the flanks of the Rocky Mountains in long. 115°. North of this limit of the Great American Desert there is a broad strip of fertile country, rich in water, woods, and pasturage, drained by the North Saskatchewan and some of its affluents, and being a continuation of the fertile prairies of Red River, the eastern water shed of the Assinniboine and Red Deer River, with the outlying patches called the Touchwood Hills, File Hill, &c.

It is a physical reality of the highest importance to the interests of British North America that this continuous belt can be settled and cultivated from a few miles west of the Lake of the Woods to the passes of the Rocky Mountains, and any line of communication, whether by waggon road or railroad, passing through it, will eventually enjoy the great advantage of being fed by an agricultural population from one extremity to the other.

No other part of the American Continent possesses an approach even to this singularly favourable disposition of soil and climate, which last feature, notwithstanding its rigour during the winter season, confers, on account of its humidity, inestimable value on British America south of the 54th parallel.

The natural resources lying within the limits of the Fertile Belt, or on its eastern borders, are themselves of great value as local elements of future wealth and prosperity; but in view of a communication across the continent they acquire paramount importance.

Timber available for fuel and building purposes; lignite coal, though not equal to true coal, nevertheless suitable for many of the different objects to which true coal is applied; iron-ore widely distributed, of great purity and in considerable abundance; salt in quantity sufficient for a dense population. All these crude elements of wealth lie within the limits or on the borders of a region of great fertility, and drained by a river of the first class, navigable by steamer during several months of the year for five hundred miles of its course, and by batteaux for nearly double that distance.

The position which the colony occupying the basin of Lake Winnipeg may assume at the close of the next decade, few will be prepared to define. Bounded on the west by British Columbia, whose gold-wealth will ensure her a marvellously rapid progress, and on the east by the powerful, energetic, and loyal colony of Canada, which now, in conjunction with the sister provinces, contains a population exceeding by ONE MILLION that of the thirteen United States during the revolutionary war, is it likely that British enterprise and patriotism will permit the intervening country to remain a wilderness, or pass into the hands of a foreign government?

It is to be earnestly hoped that the attention of far-seeing, thoughtful, and loyal men will be directed to the present relations of the new colony, its possible future, and the opportunity it presents to plant British institutions and civilization across the North American Continent; thus linking the Atlantic and Pacific oceans together with a chain of British dependencies, distinguished alike by a "SPIRIT OF LOYALTY, OF ORDER, AND OF OBEDIENCE TO THE LAW."*

The occupation and government of the basin of Lake Winnipeg has already become a serious question, and even before the rising generation succeed to the responsibilities of those who now rule the destinies of this great empire, they may have occasion to lament a lost opportunity of inestimable worth, or rejoice in the extension of British dominion over loyal populations, extending in an unbroken series from the eastern to the western hemisphere.

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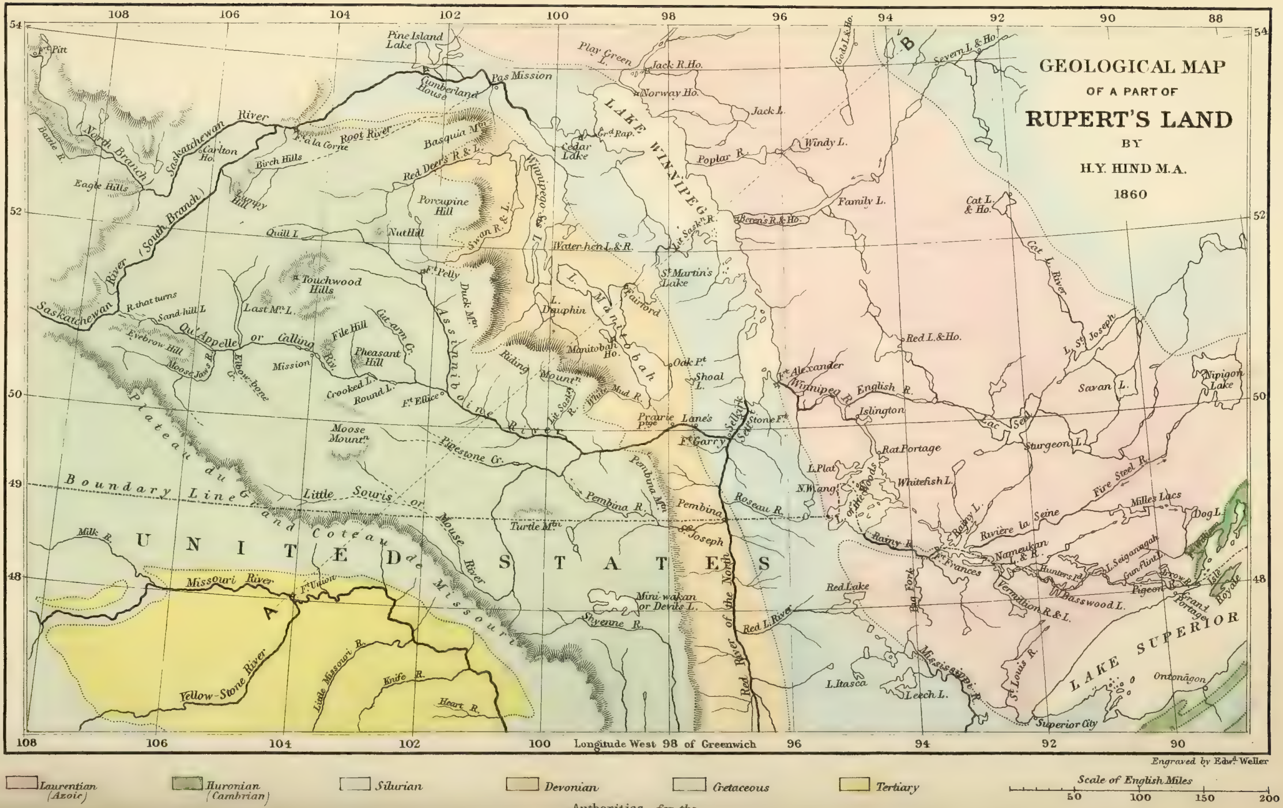
* "Her Majesty has observed with deep satisfaction the spirit of loyalty, of order, and obedience to the law, which prevails among her subjects, both in the United Kingdom and in her dominions beyond the sea; and her Majesty has witnessed with heartfelt pleasure the warm and affectionate reception given to his Royal Highness the Prince of Wales by her North American subjects."—*Her Majesty's Speech*, Aug. 28th, 1860.

GEOLOGY

OF THE

BASIN OF LAKE WINNIPEG



GEOLOGICAL MAP
OF A PART OF
RUPERT'S LAND
BY
H.Y. HIND M.A.
1860

Authorities for the

North West Shore of Lake Superior. North of the Boundary Line, Sir W. E. Logan; South Shore, Messrs. Foster and Whitney; Rainy River. Dr. Bigsby; Tertiary Basin of Missouri Dr. Hayden and Mr. Meek. See also the text for other authorities consulted.

CHAP. XXXVI.

SURFACE GEOLOGY.

Geographical Boundaries. — The Basin of Lake Winnipeg. — Limits. — Elevation of its Boundaries.—Outlet.—Area.—Character of its Rim.—— Surface Features.—Area of Low Lake Region.—Terraces of Pembina Mountain.—Escarpment of the Riding, Duck, &c. &c. Mountains.—Prairie Plateau of Rupert's Land. — Plains of the North-West. — Table of Elevations. — Detached Hills. — Country east of Lake Winnipeg.—Lakes. — Direction of Elevating Forces. — Steps to the Height of Land. —— Grooved, Scratched, and Polished Rocks. — On Baril Portage. — On Winnipeg River.—On Limestones of Lake Manitobah.——Drift.—Over the Country between Lake Superior and Winnipeg.—Lacustrine Deposits. —Drift on the Souris.—On the South Branch.—Forced Arrangement of. —In Blue Clay at Toronto.—Description of this Arrangement.—Sorting of Materials.—Agency of Water and Ice.—Glacial Ice.—Tiers of Boulders on the South Branch.—Layers of Stratified Mud.——Erratics.—Distribution of.—Effects of Ice on Lake Winnipeg.—In Lake Manitobah.—On the Red River Prairies. —— Beaches and Terraces. — Great Dog Portage.—Section of.—Beaches on Lake Superior.—On Prairie Portage. —The Big Ridge.—White Mud River Ridge.—Dauphin Lake Ridge.— Prairie Ridges.—Pembina Mountain.—Ridge, character of.—Riding and Duck Mountain Ridges.—Conical Hills. — Bear Hill. — Second Tier of Conical Hills.——Sand Hills and Dunes.—Ranges.——Circular Depressions.—Character of.——Denudation.—In the Basin of Lake Winnipeg. — Parallelism of bold Limits of Denudation. — Grand Coteau de Missouri.—Niagara Limestone Escarpment of New York and Canada.— Riding and Duck Mountains, &c. — Probable common Origin of. — Dislocations in the Basin of Lake Winnipeg.

GEOGRAPHICAL BOUNDARIES.

The Basin of Lake Winnipeg, including under this general term the country drained by the rivers flowing into it, extends from the 90th to the 118th meridian.

Its most easterly point being the lake and swamps from which the Savanne River takes its rise, in longitude 90° 14′, latitude 48° 53′, and the most westerly limit from which it draws contributions is probably the Glacier, near Howse Pass, in longitude 117° 35′, latitude 51° 52′.*

The southern extension of its boundary is at Lake Traverse in Dakotah territory, longitude 96° 45′, latitude 45° 58′.† It stretches north as far as Frog Portage, longitude 103° 30′, latitude 55° 26′.‡

This basin consequently extends over twenty-eight degrees of longitude and ten degrees of latitude.

The elevation of its eastern boundary is 1485 feet above the ocean, and the height of land near the sources of the tributary, which rises farthest to the west, is 6347 feet above the same level.§

Its northern boundary is separated from the valley of the Missinnippi by a low portage, over which waters flow during floods||; while towards the south Lake Traverse, which also sends water into the Mississippi during spring freshets, is only 820 feet above the sea.¶

The outlet of Lake Winnipeg is through the contracted and rocky channel of Nelson River, which flows into Hudson's Bay.

The mean breadth of this great inland basin is about 380 English miles, and its mean length 920 miles, hence its area is approximately 360,000 square miles. Its shape assimilates to that of a truncated section of a circle, lying

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* See Captain Palliser's Map in the Blue Book, 1860.

† Military Map of Nebraska and Dakotah, by Lieutenant G. K. Warren, U.S. Top. Eng.

‡ Sir John Richardson, Arctic Searching Expedition.

§ Dr. Hector, Blue Book. Captain Palliser's Explorations.

|| Sir John Richardson.

¶ Major Long.

in a position the reverse of that produced by the meridians and parallels distinguishing its boundary.

The eastern rim of the basin of Lake Winnipeg is formed by part of the Laurentide range of mountains, which consist of gneiss * interstratified in some localities with bands of crystalline limestone, and much embossed by domes of intrusive granite, syenite, and occasionally with elevations of trap. The highest summit of the Laurentide Mountains, as far as known in this part of their development, does not exceed 1950 feet above the sea, or 1350 feet above Lake Superior.

Striking off in a south-westerly direction from the Savanne Lake, the Height of Land extends to Lake Traverse and is composed of drift hills covering Laurentian, Silurian, and Devonian rocks, with low granitic ranges and exposures of trap. From the Dividing Ridge, at the source of the Pigeon River, south-westerly to Vermilion Lake, the Height of Land Ridge is called by the Indians *Mis-sabe Wa-chu;* in its continuation to the low water-shed between Rainy River and the Mississippi it has the name of *Ish-ko-na-bi Wa-chu.* Continued south-westerly from the Falls of Pokegama, this ridge would pass south of Leech Lake and strike the Red River of the north near the Great Bend, at which point Dr. Owen found Silurian rocks in 1848.†

From this point on Red River the rim of the basin assumes a north-westerly direction as far as the Elbow of the South Branch of the Saskatchewan, along the denuded flanks of the Grand Coteau de Missouri. From the Elbow it turns south-west as far as Chief's Mountain Lake, under the 114th meridian‡, latitude 49°, where it meets with the flanks of the Rocky Mountains, trending first north and then north-westerly. The North Branch and the main Saskatchewan indicate approximately its low northern boundary.

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* Under the general term "gneiss," micaceous, hornblendic, and chloritic schists are included.

† Geological Survey of Wisconsin, Iowa, and Minnesota.

‡ Map of the Territory of the United States, by Lieutenant G. K.

SURFACE FEATURES.

Lake Winnipeg, at an altitude of 628 feet above the sea, occupies the lowest depression of this great central basin, covering, with its associated Lakes Manitobah, Winnepego-sis, Dauphin, and St. Martin, an area slightly exceeding 13,000 square miles, or nearly half as great an extent of the earth's surface as is occupied by Ireland.

The country possessing a mean elevation of one hundred feet above Lake Winnipeg is very closely represented by the outline of Pembina Mountain, forming part of the eastern limit of the Cretaceous Series in the north-west of America, as represented on the geological map.

The area occupied by this low country, which includes a large part of the valley of Red River, the Assinniboine, and the main Saskatchewan, may be estimated at 70,000 square miles, of which nine-tenths are lake, marsh, or surface rock of Silurian or Devonian age, and generally so thinly covered with soil as to be unfit for cultivation, except in small isolated areas.

Succeeding this low region there are the narrow terraces of the Pembina Mountain, which rise in abrupt steps, except in the valleys of the Assinniboine, Valley River, Swan River, and Red Deer's River, to the level of a higher plateau, whose eastern limit is formed by the

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Warren, Top. Eng., ordered by the Honourable Jefferson Davis, Secretary of War, to accompany the Reports of the Explorations for a Railroad Route to the Pacific.

precipitous escarpments of the Riding, Duck, and Porcupine Mountains, with the detached outliers, Turtle, Thunder, and Pasquia Mountains. This is the great PRAIRIE PLATEAU of Rupert's Land; it is bounded towards the south-west and west, by the Grand Coteau de Missouri, which forms the north-eastern limit of the PLAINS* of the north-west. The area of the Prairie Plateau, in the basin of Lake Winnipeg, is about 120,000 square miles; it possesses a mean elevation of 1100 feet above the sea, and is approximately represented on the geological map by the Cretaceous Series, coloured green, north-east of the Grand Coteau. The following table shows the relation of these successive levels :—

	Mean Elevation above the Ocean.	Approximate Area in Square Miles.
Low Country (1st Plateau) .	. 700 .	. 70,000
Terraces of Pembina Mountain .	. 900—1100	. 1,500
Great Prairie Plateau (2nd Plateau)	. 1100 .	. 120,000
Great Plain Plateau (3rd Plateau)	. 1600	———

The Riding and Duck Mountains, with their southern and northern prolongations, probably once formed part of an unbroken level to the Grand Coteau; the intervening depression having been the result of denudation. The isolated ranges of hills, such as the Touchwood Hills, the File Hill, the Pheasant Hill, the Birch Hills, the Lumpy Hill, &c., are parts of this former elevated table-land, and would assume the character of islands in a sea washing the base of the Grand Coteau de Missouri.

On the east side of Lake Winnipeg the primary unfossiliferous rocks along the canoe routes present a broken and extremely irregular surface to the mouth of Rainy River, where the fossiliferous formations are touched. From Rainy Lake to Superior the routes pass through a water communication, possessing many singular geographical outlines, arising from the geological features of the country.

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* The difference between "Prairies" and "Plains" is stated in Chap. XVI.

Both Lake Superior and Lake Winnipeg belong to the same geological basin, and are excavated in its rim, the low Laurentide Mountains separating the great northern basin of fossiliferous rocks from it.

The canoe routes between Lake Superior and Lake Winnipeg form, therefore, two chords on the edge of the gneissoid and granitic boundary dividing these geological basins, and while the general trend of this part of the Laurentide Mountains is geographically north-west, the direction of the undulations, by which it is intersected, is generally north-east and south-west, or at right angles to the former. This disposition is best developed east of Rainy Lake, and on the Pigeon River route, where the agency of the elevating force appears to have acted with greater constancy and uniformity than on the more northern canoe route. The outbursts on the southern route, as well as on the south shore of Lake Superior, are also considerably higher, and the lakes and lake straits more symmetrically arranged.

An inspection of the geographical map will show that the longest axis of nearly all the smaller lakes in the region under review is from N.E. to S.W.

A range of greenstone ridges, forming an anticlinal axis, begins at the Great Bend of the St. Louis River, and runs in a direction N. 30° E. towards the sources of Arrow River and Mountain Lake. The systems of valleys and ridges, resulting from the direction in which the elevating forces have acted in the region about the western extremity of Lake Superior, have been ably discussed by Dr. Norwood.*

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* Owen's Report of a Geological Survey of Wisconsin, &c.

GROOVED, SCRATCHED, AND POLISHED ROCKS.

Instances of the action of ice in abrading and polishing extensive surfaces of rock are very numerous on the Laurentides between Lake Superior and Lake Winnipeg. The first wide expanse observed on the west side of the water-shed is at Baril Portage, 143 miles from Lake Superior, and 1500 feet above the sea. Where an arm of Mille Lacs approaches this portage, gneissoid hills and islands about 100 feet high show a well defined stratification dipping north, at an angle of about 15°, and on that side smooth, and sometimes roughly polished; on the south side they are precipitous and abrupt. The same character is observed on the portage itself; the north-eastern exposures of the rocks there are smooth and striated, the southern rugged and often precipitous.

On Sturgeon Lake 208 miles from Lake Superior and 1156 feet above the sea, the north-eastern extremities of hill ranges slope to the water's edge, and when bare are always found to be evenly smoothed and ground down. The aspect of the south and south-western exposures is that of precipitous escarpments.

On a small island about twenty-five miles north of Garden Island, Lake of the Woods, there is a remarkable exposure of greenstone conglomerate, nearly on a level with the water of the lake. The surface of the rock is almost horizontal, beautifully polished, and strongly marked with glacial furrows and scratches. The direction of the furrows is N. 25° E., they are all parallel to one another, some of them half an inch in depth, and nearly double that measure in width. They pursue a uniform direction for many yards until concealed by the bushes which fringe the bare rock some forty or fifty feet from the water's edge.

The conglomerate presents the appearance of an immense table of mosaic work. The pebbles and small boulders enclosed in the matrix have been apparently water worn, some of them, however, showed no lateral abrasion, preserving their angles sharp, and well defined. They were all ground down to one uniform polished surface.

The imbedded boulders and pebbles varied from half an inch to eighteen inches in diameter, and appeared generally to lie with their flat side facing the south-west. The colour of the matrix was a pale green, and of the imbedded pebbles grey, with a tint of green. A vertical section of the rock exhibited the pebbles and boulders, as if resting upon the extremity of the longest axis, with a slight inclination to the east.

From the summit of an abraded granite hill about 250 feet high, on the Winnipeg west of "the Dalles," a very extensive view of the surrounding country is obtained. The broad river, with its numerous deep bays, may be seen stretching far to the north, and all around smooth dome-shaped hills show their bare and scantily wooded summits in every direction. The general surface is either bare and so smooth and polished as to make walking dangerous, or else thickly covered with cariboo moss and tripe de roche.

This general description applies to a vast area drained by the Winnipeg, and on the smoothed and polished rocks glacial grooves may be easily traced for long distances; sometimes also boulders are found resting upon the polished surfaces. On one occasion an attempt to ascend a round dome-shaped mound forming the summit of a granite hill was frustrated by its beautifully polished surface preventing a footing from being obtained. The action of atmospheric agents had only succeeded in dimming its beauty, but had not destroyed its smoothness.

Grooves and scratches occur on the limestones of Lakes Winnipeg and Manitobah, where the surface has been preserved from atmospheric agencies, but whether they are of recent origin or connected with the drift, is not certain.

DRIFT.

The distribution of drift throughout the region lying between Lake Superior and Winnipeg is limited to a few detached areas. The most important of these east of the Height of Land is at the Great Dog Portage, where it occurs in the form of beaches and terraces, which will be described further on. The terraced drift in the valley of the Kaministiquia, below the Kakabeka Falls, is evidently of lacustrine origin. The Height of Land is covered with true boulder drift, having an elevation of about 1500 feet above the present level of the ocean; but on the Height of Land at the sources of the Pigeon River, boulder drift occurs at a considerably higher level.

Small areas of drift may be found at the different portages, and on the islands in Mille Lacs, but in no instance east of Rainy River, were they seen of sufficient extent as to warrant especial notice. In the valley of Rainy River buff-coloured unstratified clay, containing magnesian limestone boulders, and superimposed by stratified clay, occupies both banks for some distance along the river. On the Winnipeg, patches of drift begin at the Islington Mission, and, though far apart from one another, increase in area as the country sinks, until, at the Manitou Rapids, drift clay forms the banks of the river and continues to its mouth.

In the lower part of the Valley of Red River unstratified clay, with boulders from Laurentian rocks and limestone, rises from the water's edge to within four feet of the surface, after which its colour changes, it shows stratification, and is evidently lacustrine. The unstratified clay contains a large per centage of magnesia derived from the underlying rocks.

At Lane's Post on the Assinniboine, the quaternary lacustrine deposit, eight feet below the surface, presents the appearance of irregularly stratified bands of extremely fine material deposited in quiet waters. Upon close examination the bands are found to consist of a series, in which light ash-coloured and dark brown layers alternate, about $\frac{1}{4}$ to $\frac{1}{16}$ of an inch in thickness. In the light-coloured bands minute crystals of sulphate of magnesia and common salt are common. The clay is characterized by its extreme fineness, the marked absence of silicious particles in the form of sand, and the presence of carbonates of lime and magnesia in variable quantities. In certain localities carbonate of lime exists in proportions sufficient to constitute a marl.

The following section is exposed at Lane's Post: —

	Feet.
Vegetable prairie mould	1
Unstratified alluvial clay	5
Stratified dark-coloured clay with light ash-coloured bands	12
Total	18

The subsoil on Red River, near the middle settlement, four feet below the surface, is much darker coloured, not so distinctly stratified, and contains abundance of mica in very fine brilliant plates. The particles of the subsoil on either river are extremely minute, and difficult to separate by washing.

The drift on the Blue Hills of the Souris is chiefly of local origin, and consists almost exclusively of the shales which form the outcrop of the Cretaceous rocks whose limit is defined by the Pembina Mountain. Its age is consequently posterior to that of the true Boulder drift, which is generally distributed over the high prairies to the west, and will be described further on in connection with *beaches* and *conical hills.*

On parts of the Little Souris River the drift is very shallow, indeed it is doubtful whether true Boulder drift is present, the character of the surface material leading to the supposition that it is derived almost exclusively from the subjacent rocks.

The drift on the South Branch of the Saskatchewan, below the Moose Woods, is distinguished by a remarkable peculiarity in the arrangement of the slabs of limestone and boulders of the unfossiliferous rocks distributed through the clay, which do not occupy the position they would assume if dropped from floating ice into soft mud.

Every fact relating to the drift possesses some degree of interest, and may assist in the elucidation of that stupendous phenomenon and its subsequent changes, as well as tend to remove difficulties with which the whole phenomena of the drift are still invested.*

In the blue clay at Toronto, the capital of Western Canada, an arrangement similar to that which exists among the coarser materials of the drift on the South Branch is remarkably well preserved.

During the construction of the esplanade at Toronto, the plan pursued of removing the blue clay was well adapted to show a perfect sectional view of its components, without the risk of changing in the least degree their relative positions. The clay was cut away until a perpendicular wall was left, varying from ten to twenty feet in height, according to the locality. Wedges were then inserted at the top of the artificial cliff, about two feet from its edge, and driven into the clay until a mass, frequently two feet broad, fifteen or twenty feet long, and twelve or eighteen feet deep, separated and fell. The fresh surface thus exposed was necessarily quite natural in every respect, not having been touched by the tool of the workman or changed by exposure to the weather, and during the years 1855 and 1856, a large area of sectional surface was laid open to view. Two varieties of blue clay exist in the neighbourhood of Toronto, forming deposits quite distinct from one another. The deposit in question overlies rocks of Silurian age, which are exposed in many localities on the lake shore and on the banks of the rivers near the city; it rests upon a blue argillaceous shale, easily recognized as constituting in fragments of different sizes, a large proporton of the substance of the blue clay.

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* The forced arrangement of blocks of limestone, slabs of shale and unfossiliferous boulders in the blue clay of Toronto, formed the subject of a paper which I read before the Canadian Institute some years ago. As the opportunities for making observations upon this peculiar arrangement were very favourable at that time, I shall here introduce an abstract of the paper, with a view to explain the manner in which slabs and boulders are found arranged in the Drift on the South Branch. (See Report on the Assinniboine and Saskatchewan Exploring Expedition, p. 120.)

The thickness of this deposit of blue clay varies from ten to twenty-five feet; its upper surface is irregular and undulating, and upon it reposes, in some places, stratified sand and yellow clay, in others, unstratified yellow clay. Resting on the sand or yellow clay, another kind of blue clay occurs, differing, however, essentially from the blue clay which lies at the base of the whole. The lower or inferior blue clay contains quartz sand and small rolled pebbles of granitic rocks, a considerable proportion of blue shale containing fossils belonging to the Silurian shales upon which it rests, and frequently large fragments of the last-named rock, together with more or less rolled or worn masses of granite, gneiss, &c.

The fragments from the Silurian shales often possess sharp and well-defined edges, showing that they have not been water worn or removed far from the rock from which they originated. They are found not only a few inches from the surface of the parent rock, but in numerous instances from fifteen to twenty feet above it, imbedded in a peculiar manner in the blue clay. Some of the larger fragments are scratched and grooved.

A cursory inspection of the artificial cliffs, as they existed during the construction of the esplanade, was sufficient to show that a considerable number of the pebbles and imbedded masses of rock did not occupy the position they would assume if they had not been subjected to some other force besides that of gravity or water in motion. The inclination of the subjacent rock is so slight (thirty feet in the mile) that for all purposes of the present inquiry it may be considered horizontal; and it may be further remarked, that there is no reason to suppose that any material change in position has occurred since or during the accumulation of the blue clay. A large number of the fragments of rock seen in the blue clay are symmetrically inclined at an angle of 60°, 70°, and 80° to the horizon, and frequently lean towards the east and north-east.

What force has thus symmetrically arranged these fragments of shale, &c.? That they now preserve the position into which they were forced by pressure, or that they were brought from a distance and left in that position, is sufficiently evident, as we cannot entertain the opinion that the rock on which the boulder drift rests has materially changed its inclination since or during the Drift epoch.

There can be no doubt that a very large portion of the drift of Canada has been rearranged since it was first deposited. The inferior layer of blue clay is, however, essentially different from the upper layer which is frequently separated from it by a few feet of sand, and in some instances may even directly overlie it and consist of a rearrangement of its materials. The superior blue clay, together with the sand and yellow clay, frequently give evidence of stratification, and thus explain at once the nature of the force to which they have been subjected.

The position of the rock fragments in the inferior blue clay, proves that it cannot have been exposed to the action of water, otherwise they would not preserve the forced arrangement which distinguishes them. Fragments of shale, if submitted to gravity alone, would not have assumed the position in which they were found, had they dropped through water in motion or water at rest, into soft mud. It is well known that shingle, sand, gravel, and clay, either separately or combined, when thrown down an incline, as in the construction of a railway embankment or as in a land slip, will assume a position upon the surface of the embankment, which, if composed of sand, is generally inclined about 45° ; if of harder or coarser materials, at a higher angle. If the embankment or incline be formed under water, like the deltas at the mouths of rivers, this inclination is much less, and is dependent upon the specific gravity of the materials, but under no circumstances is it so high as 45°. If the existence of a current of water sufficiently powerful to move masses of shale and boulders of the unfossiliferous rocks, it cannot be supposed that they would be found deposited upon the slope of a bank at so high an angle as the shale and boulders in the blue clay of Toronto, or the drift on the South Branch of the Saskatchewan, neither is it in the least degree probable that the current which could transport such heavy materials would admit of a *mixture* of clay, sand, shale, and boulders. The materials would be sorted by the current and deposited in the order of their specific gravity. The *sorting* of *materials* is one of the most positive proofs of the action of currents; and where no trace of *sorting* can be discovered, when fine sand, coarse sand, pebbles, and boulders are present, we may reasonably infer that no current assisted in distributing them.

Among the foreign materials entering into the composition of the blue clay, we find granitic masses which have been brought from the outskirts of the fossiliferous rocks in Canada, a distance of at least 100 miles from their present position, and throughout the blue clay we discover also the magnetic oxide of iron.

The materials of local origin exist in great abundance in the form of fragments and masses of shale, limestone, and clay derived from the underlying shales, &c. The nature of the agent which transported the foreign materials from so great a distance is almost universally acknowledged to have been water and floating ice. The finer materials may have been conveyed by water, the coarser drift and erratics would require floating or moving ice. There can be little doubt that both water and floating ice (icebergs and floes) have been instrumental in bearing from northern fossiliferous and unfossiliferous rocks a considerable proportion of the numberless erratics strewn over the surface of a large part of this continent, as well as much of the clayey deposits so plentifully distributed north of the 40th parallel. But the symmetrical arrangement of some of the slabs, pebbles, and boulders in the blue clay at Toronto, in the clay cliffs of the South Branch of the Saskatchewan, and in other localities where the same disposition may be witnessed, points also to the action of *glacial* or *stranded* ice. The phenomena may be explained by coast ice, or the dirt bands of glacial ice, but the entire absence of a sorting of fine and coarse materials, seems to destroy the hypothesis which introduces the agency of currents of water, as the forced but symmetrical arrangement does that of floating ice.

The wide-spread phenomena exhibiting the greater or less action of ice, such as grooved, polished, and embossed rocks, the excavation of the deep lakes of the St. Lawrence basin, the forced arrangement of drift, the ploughing up of large areas, and the extraordinary amount of the denudation at different levels without the evidence of beaches, all point to the action of glacial ice previous to the operations of floating ice in the grand phenomena of the Drift.

The long lines of boulders exposed in two parallel horizontal rows, about twenty feet apart, in the drift of the South Branch, are the records of former shallow lakes or seas in that region. They may represent a coast line, but more probably low ridges formed under water, upon which the boulders were stranded. In the shallow lakes of the Winnipeg basin, the boulders brought year by year by ice from the neighbouring shore accumulate upon long, narrow spits, and ultimately form breakwaters or islands. The same process may have occurred with the boulders on the South Branch. The fine layers of stratified mud, easily split into thin leaves, which lie just above them, show conclusively that they were deposited in quiet water; their horizontality proves that they occupied an ancient coast, floor or ridge below the comparatively tranquil water of a shallow lake. The vast accumulations of sand and clay above them establish the antiquity of the arrangement, and the occurrence of two such layers parallel to one another, and separated by a considerable accumulation of clay and sand, leads to the inference that the conditions which established the existence of one layer also prevailed during the arrangement of the other. These boulders may be distributed over the level floor of a former lake or sea, and cover a vast area; if this be the case it only proves that the agents which brought them operated a second time, after a long intervening period, and with similar results. The fine mud has been submitted to careful microscopical investigation, without establishing the presence of diatomaceæ, or any organic forms from which conclusions might be drawn respecting its origin.

ERRATICS.

The distribution of boulders or erratics in the area explored, may be traced as in Canada to at least two epochs; the Drift and Boulder period, during which by far the larger number were torn from the parent rock and carried by ice to their present resting-places, and the Recent period, including the rearrangement of ancient drift and the distribution of fresh supplies by the action of ice.* The largest boulder was seen in the valley of the Qu'appelle. The circumference of this enormous erratic is seventy-eight feet, and it exposes a portion above ground at least fourteen feet in altitude. The next largest, one of limestone, was seen on the prairies below the Moose Woods; it is about sixteen feet high, and at least sixty in circumference, is very jagged, and consists of immense slabs, whose edges project two and three feet.* Near it are many others of the same kind, but of smaller dimensions. Near Little Cut Arm Creek, an affluent of the Qu'appelle, large unfossiliferous boulders are very numerous. North of the Assinniboine, near the Big Ridge, boulders are also abundant, and when magnified by refraction look like tents on the level prairies.

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* Where erratics are distributed in large quantities, the locality is indicated on the map accompanying the Reports on the Assinniboine and Saskatchewan Exploring Expedition.

The ice on Lake Winnipeg carries off, every spring, fragments of rock belonging to the Laurentian Series which form its eastern shores. Many of these are distributed over the shallows and on the beaches of the western side of the lake; these phenomena resemble in miniature the stupendous operations described by travelers as continually occurring on the shores of the Arctic Ocean.

In Lake Manitobah long lines of boulders are accumulating in shallows and forming extensive reefs; the same operation is going on in all the lakes of this region, and is instrumental in diminishing the area of the lake in one direction, which is probably compensated by a wearing away of the coast in other places. Several of these modern accumulations formed by a re-arrangement of the boulders of the older drift are noticed in preceding chapters. Taken as a whole, and in connection with the destruction of the coasts, they afford a striking illustration of the changes now taking place in the relations of land and water throughout the Lake Region.

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* This erratic was probably one of the series traced by Dr. Hector, from "the Thickwood Hills, in a southerly direction towards the Moose Hills on the South Branch."—*Papers relative to the Exploration of British North America*, 1859.

The boulders and slabs of limestone on the low prairies of Red River and the Assinniboine resting upon lacustrine deposits, were probably brought by ice at a period posterior to the Boulder Drift. They are illustrations of the operations of ice at higher lake levels, similar to those occurring at the present time.

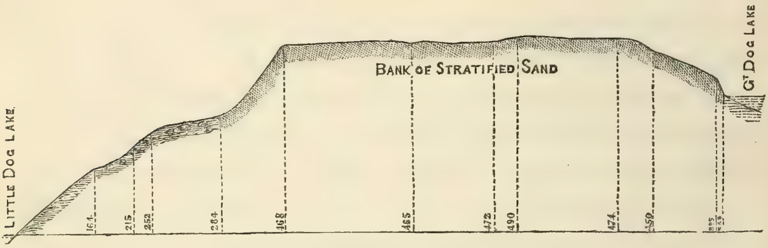
BEACHES AND TERRACES.

The most remarkable beach and terrace between Lake Superior and Lake Winnipeg, showing an ancient coast line, is undoubtedly that which separates Great Dog from Little Dog Lake on the Kaministiquia canoe route.

The Great Dog Portage, fifty-five miles from Lake Superior by the canoe route, rises 490 feet above the level of the Little Dog Lake, and the greatest elevation of the ridge cannot be less than 500 feet above it. The difference between the levels of Little and Great Dog Lakes is 347·81 feet, and the length of the portage between them, one mile and fifty-three chains.

It is stated in Chapter II. that the base of the Great Dog Mountain consists of a gneissoid rock supporting numerous boulders and fragments of the same material. A level plateau of clay then occurs for about a quarter of a mile, at an altitude of 283 feet above Little Dog Lake, from which rises, at a very acute angle, an immense bank or ridge of stratified sand, holding small water-worn pebbles. The bank of sand continues to the summit of the portage, or 185 feet above the clay plateau. The portage path does not pass over the highest part of the sand ridge; east of the path it is probable that its summit is 500 feet above the Little Dog Lake.

Height in Feet.	Distance in Feet.	Margin of Beaches.
ft.	ft.	
163·53	1000	Beginning of 1st plateau.
215·00	1450	Termination of do.
251·74	1650	Beginning of 2nd do.
283·78	2550	End of 2nd plateau, and commencement of sand bank.
468·19	3300	Commencement of 3rd plateau.
472·60	5920	End of 3rd plateau.
490·00	6180	Summit of level and commencement of 4th plateau.
474·00	7400	End of 4th plateau, and commencement of descent to edge of cliff.
395·00	8640	End of descent.
348·00	8712	Bottom of cliff, and level of Great Dog Lake.



Profile of the Great Dog Mountain.*

Here then we have a terrace 490 feet above Little Dog Lake, or 853 feet above Lake Superior, or 1453 feet above the sea, and furnishing an admirable proof of the value of Dr. Hitchcock's expectation that higher beaches than those measured by Sir William Logan on the shores of Lake Superior would be found in that region. In his Surface Geology, Dr. Hitchcock says, page 63 (Smithsonian Contributions), "I will only add, that if it be admitted that the facts adduced in this paper prove the presence, since the Drift period, of the ocean at a height of 2000 or even 1200 feet, above its present level, then it must have extended over nearly all of our western country; and unless Professor Agassiz says that he had his eye upon this matter along the shores of Superior, I cannot avoid entertaining the expectation, that what I call beaches will yet be found at a much higher level there, than the 331 feet terrace, measured by Mr. (now Sir William) Logan."

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* This section was kindly furnished me by Mr. Napier, the engineer to the Red River Expedition, 1857.

I am inclined to think that another beach and terrace can be recognised at Prairie Portage, one hundred and four miles by the canoe route from Lake Superior; its altitude would exceed that on the Great Dog, being 1485 feet above the ocean. Prairie Portage passes over the height of land, but not the highest land on the route, and its course lies first, south-west up a steep wooded hill, without rock exposure, but composed of drift clays, sand, and numerous boulders; it then enters a narrow valley, which terminates in a small lake, about five acres in area and 20 feet deep, occupying a hollow among the hills on the height of land. The portage path continues on in the same direction until the Height of Land Lake is reached, a small sheet of water, about a square mile in area, and 157 feet above Cold Water Lake. The utmost elevation reached on the Prairie Portage is probably 190 feet above Cold Water Lake or nearly 900 feet above Lake Superior. Portage du Milieu, one hundred and five miles from Lake Superior passes over a low sandy ridge. It is 869 feet above Lake Superior, or 1469 feet above the sea; this ridge may have been contemporaneous with beaches on the summit of the Great Dog.

In the valley of Lake Winnipeg the first prominent ancient beach is the Big Ridge.

Commencing east of Red River, a few miles from Lake Winnipeg, this ridge pursues a south-westerly course until it approaches Red River, within four miles of the Middle Settlement, here it was ascertained by leveling to be

67½ feet above the prairie. On the opposite side of the river, a beach on Stony Mountain corresponds with the Big Ridge, and three or four miles further west it is observed marking the limit of a former extension of the valley of Lake Winnipeg. On the east side of Red River the Big Ridge is traced nearly due south from the Middle Settlement to where it crosses the Roseau, forty-six miles from the mouth of that stream, and on or near the 49th parallel. It is next met with at Pine or Tamarac Creek, in the State of Minnesota, and from this point it may be said to form a continuous and horizontal gravel road, beautifully arched, and about one hundred feet broad, the whole distance to the shores of Lake Winnipeg, or more than 120 miles.

On the west side of Red River, and north of the Assinniboine, I traced the Big Ridge from a point about three miles west of Stony Mountain to near Prairie Portage. Here it appears to have been removed by the agency of the Prairie Portage River and the waters of the Assinniboine, which are said to pass from the valley of that river into Lake Manitobah during very high floods.

Another and higher ridge was observed on White Mud River, about twenty miles west of Lake Manitobah. It resembled in every particular the ridge on the east side of Red River, being about 100 to 120 feet broad, and about twenty-five feet above the level of the prairie. It was again noticed in the rear of Manitobah House, where the same characteristics were preserved. It probably crosses the Assinniboine three or four miles west of Prairie Portage, and is perhaps identical with the lowest ridge or step of the Pembina Mountain.

In the rear of Dauphin Lake, the next ridge in the ascending series occurs, it forms an excellent pitching track for Indians on the east flank of the Riding Mountain. Probably these ridges are found close together, at the foot of the Pembina Mountain, where no less than four distinct steps occur close together near the sources of Scratching River.* The summit of these steps may be the plateau whose altitude was ascertained by Dr. Owen to be 210 feet above the prairie level, and the first steps may be continuous with the Big Ridge, limiting the level prairies of Red River and the Assinniboine.

The prairies enclosed by the Big Ridge are everywhere intersected by small subordinate ridges, which often die out, and are evidently the remains of shoals formed in the shallow bed of Lake Winnipeg when its waters were limited by the Big Ridge. Many opportunities for observing the present formation of similar shoals occurred in Lake Manitobah, St. Martin's Lake, Lake Winnipeg and Dauphin Lake. These, when the lakes become drained, will have the form of ridges in the level country then exposed. Indeed it may be said that the region between Dauphin Mountain and Lake Manitobah in the direction of Ebb and Flow Lake and south of that body of water, is but recently drained, or still in process of draining, being removed from the surface of Ebb and Flow Lake, by a very few feet and covered with water to a large extent in the spring. At present it consists of marsh, bog and ridge, in continued succession. When completely drained, the country will resemble the present prairies of the Assinniboine, with the gentle rich depressions, and the low dry gravelly ridges.

The Pembina Mountain is *par excellence* the ancient beach in the valley of Lake Winnipeg. Dr. Owen thus described it as it presents itself a few miles south of the 49th parallel: "After a hot and fatiguing ride over the plains, we arrived an hour after sunset at the foot of the Pembina Mountain. In the twilight as we stood at our encampment on the plain, it looked as if it might be three hundred feet or more in height; but in the morning, by broad daylight, it seemed less. When I came to measure it, I was somewhat surprised that it did not exceed 210 feet. I observed on this as on many other occasions that a hill rising out of a level plain, appears higher than it really is, especially when, as in this case, the trees on its flank and summit are of small growth. Pembina Mountain is in fact, no mountain at all, nor yet a hill. It is a terrace of table-land, the ancient shore of a great body of water, that once filled the whole of the Red River valley. On its summit it is quite level and extends so, for about five miles westward, to another terrace, the summit of which I was told is level with the great Buffalo Plains, that stretch away towards the Missouri, the hunting grounds of the Sioux and the half-breed population of Red River.

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* The steps are shown on Sheet 2 of the large map accompanying the Reports on the Assinniboine and Saskatchewan Exploring Expedition.

Instead of being composed of ledges of rock, as I was led to suppose, it is a mass of incoherent sand, gravel, and shingle so entirely destitute of cement, that with the hand alone a hole several feet deep may be excavated in a few minutes. The Pembina River has cut through this material a deep, narrow valley, but little elevated above the adjacent plain. Along its banks are precipices of sand, surmounted by gravel and a few boulders. I was told that it was impossible to ascend these banks. So loose is the deposit, that, no sooner is an ascent attempted, than the stones fifty or a hundred feet above, are detached, and come tumbling down at such an alarming rate that the climber is glad to make his escape."*

An inspection of the map will show the contour of the Pembina Mountain as far as ascertained; where Mr. Dickinson ascended it, fifteen miles north of the 49th parallel it occurs in four distinct terraces. It crosses the Assinniboine near the Bad Woods, blends with the Riding and Duck Mountains, and probably appears again on the main Saskatchewan, twenty-two miles from the Grand Forks. The elevation of the entire country east of this long ancient coast line is about 700 feet above the level of the ocean, and it forms the boundary of a distinct tract of lowland, in part surpassingly rich, as over the Red River and Assinniboine prairies, and the region on the main Saskatchewan slightly elevated above the area subjected to annual overflow; part covered with swamp, marsh, or level limestone rock, on which a few inches of soil affords nourishment to small spruce, tamarac, and aspen; and finally, by a shallow water area extending over 13,100 square miles, and embracing lakes which rank with the first class in point of superficies on this continent.

High above the Pembina Mountain the steps and terraces of the Riding and Duck Mountains arise in well-defined succession. On the southern and south-western slopes of these ranges the terraces are distinctly exposed to view; on their north-east and north sides, the Riding and Duck Mountains present a precipitous escarpment which is elevated fully 1000 feet above Lake Winnipeg, or more than 1600 feet above the sea.

Standing on the edge of the escarpment of the Riding Mountain and looking in the direction of Dauphin Lake, a gulf, some two hundred and fifty feet deep, is seen to be succeeded by two ranges of cone-shaped hills covered

* Geological Survey of Iowa, Wisconsin, and Minnesota, p. 179.

with boulders, one lower than the other. The hills are parallel to the general trend of the escarpment, and stand out as bold eminences, showing the extent of the denudation which gave rise to them. These ranges of conical hills correspond with terraces on the west side of the mountain. They are the result of the same denuding forces which have left their impress upon the west flank, and were formed by the unequal wearing away of the more exposed eastern flank, at the time when the terraces on the opposite and sheltered side were in process of arrangement.

I estimated the summit of Bear Hill, one of the most prominent of the conical hills separated from the edge of the escarpment by a deep valley, at 800 feet above Lake Winnipeg; if to this altitude we add 628 feet, the height of Lake Winnipeg above the sea, the elevation of the first terrace below the summit of the mountain, will be about 1,428 feet. This altitude corresponds in a remarkable manner with the sand bank on the Great Dog Portage, 500 miles distant in an air line from Bear Hill. The second tier of conical hills stands upon the second terrace from the summit, and is probably continuous with the Pembina Mountain.

SAND HILLS AND DUNES.

The most extensive of these unstable ranges are described in the narrative.

It is needless to remark that the region they occupy is almost absolutely barren. Many of the hills and dunes are continually exposing fresh surfaces, sometimes beautifully ripple marked. The probability of their being the remains of tertiary deposits, is noticed in a subsequent chapter. The following are the most extensive ranges:—

1. Sand hills and dunes of the Assinniboine, extending

from the Bad Woods to a short distance beyond Pine Creek, forty miles.

2. Sand hills of the Souris.
3. Sand hills and dunes of the Qu'appelle.
4. Sand hills and dunes of the South Branch.
5. Sand and gravel ridges north-west of the Touchwood Hills.

CIRCULAR DEPRESSIONS.

This curious disposition of the drift, probably due to a re-arrangement of its materials, is of not uncommon occurrence south-east of the Touchwood Hills. Circular depressions varying from 100 yards to half a mile in diameter, appear in the prairies, generally surrounded by a ridge of sand or gravel. Many of them are quite dry, others hold water, which is generally brackish. The deepest and largest depression noticed was about 600 yards across and 40 feet below the general level.

DENUDATION.

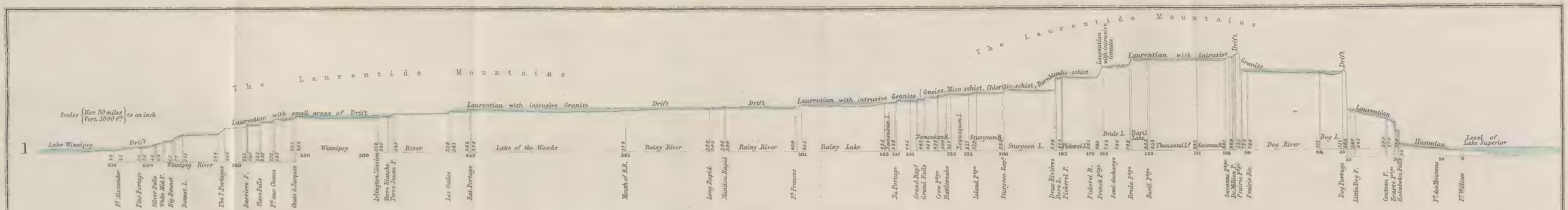
An adequate conception of the effects of denudation in the basin of Lake Winnipeg can be best attained if we revert to the period when the Cretaceous shales now forming the summit and flanks of the Turtle, Riding, Duck, Porcupine, and Pasquia Mountains, occupied the basins of Lakes Manitobah and Winnipeg, and found their eastern limits near the present outcrop of the Laurentian Series. In order to complete our view of the extent of this great physical movement, we must conceive the same shales and sandstones, (in part overlaid by Tertiaries filling the depressions or valleys in the Cretaceous rocks, the result of previous denudation) forming an unbroken table-land to the Grand Coteau de Missouri. These relations become more evident upon an inspection of the sections.

LIMITS OF DENUDATION.

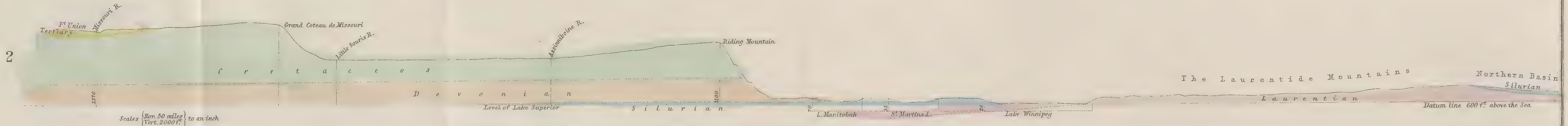
A curious and very interesting example of parallelism in bold limits of denudation, can be traced in the basins of Lake Winnipeg and the St. Lawrence. The abrupt escarpment of the Grand Coteau de Missouri preserves a direction throughout the greater portion of its denuded face, parallel to the escarpment of the Niagara limestone which enters Canada from the State of New York at Lewiston, on the Niagara river, and sweeping round the head of Lake Ontario passes up the Indian Peninsula and thence to the Grand Manitoulin Island in Lake Huron. The denuded flanks of the Riding and Duck Mountains with their northern and southern prolongations also preserve the same general direction. Lines drawn on a map of North America to show these well-marked limits of denudation at different periods, will at once suggest the existence of a uniformly acting force operating under similar physical conditions. Like beaches or ridges formed at different sea-levels they have probably a common origin, which the supposition of their being ancient coast-lines is not sufficient to explain, neither do their geographical relations appear to be altogether dependent upon their geological structure. They seem to point to the action of currents, of which the Gulf stream and the compensating Arctic currents are modern illustrations.

DISLOCATIONS.

The basin of Lake Winnipeg from the Laurentides to the Rocky Mountains, has been subjected to a series of dislocations, which have acted very uniformly over areas far apart. The courses of rivers show the general direction of these gradual disturbances, which may have given rise to the numerous "Elbows" which form such a marked feature in the water channels, and consequently

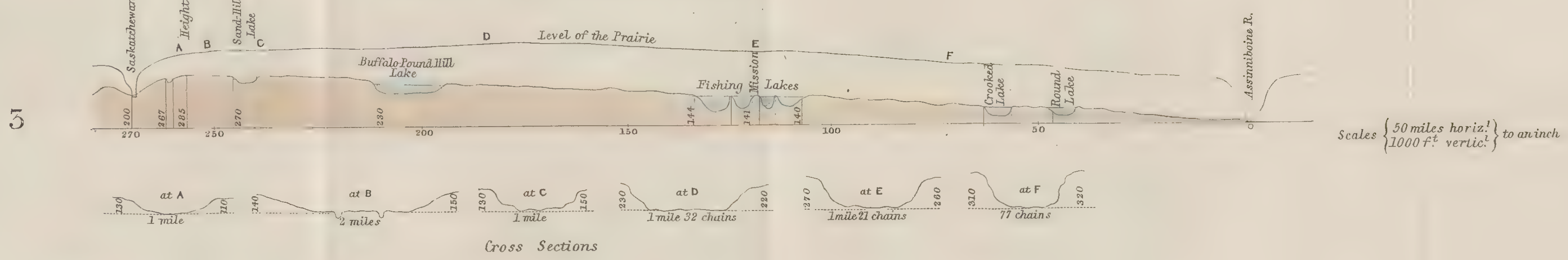


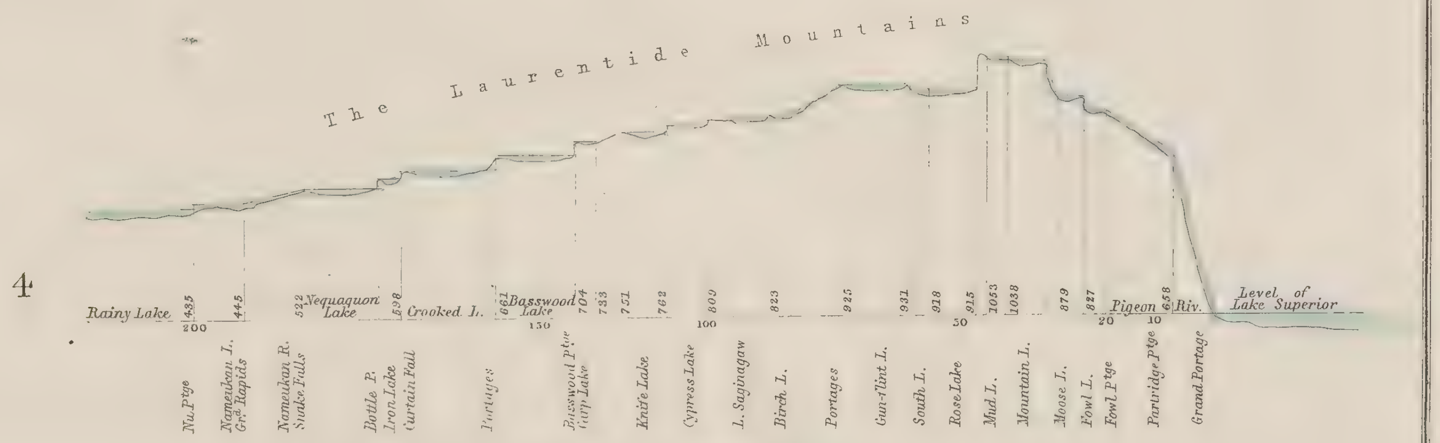
Profile of Kaministiquia Route



Profile of Country *along the dotted line* A. B. *on* Geological Map

Profile of Qu'Appelle Valley





Profile of Pigeon-River Route

Engraved by Edwd. Weller

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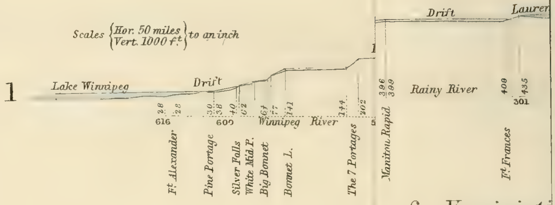

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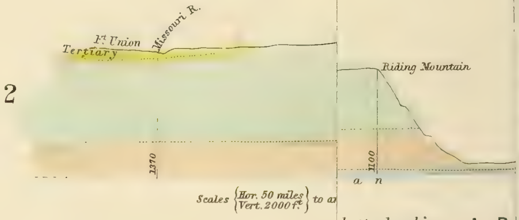

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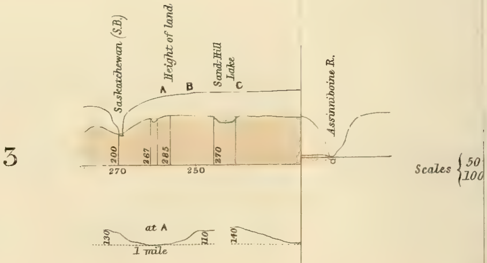

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in the surface of the rocks of a large part of Rupert's Land. The following table shows the probable effect which has been produced by some of these dislocations :—

Name of Lake and River.	Change of course.
1. St. Martin Lake and the Little Saskatchewan . . .	N. to S.E.
2. Dauphin Lake, Moss River and Waterhen River . . .	N.E. by E. to S.E. by S.
3. South Branch of the Saskatchewan (Elbow) . . .	S.E. to N.E.
4. North Branch of the Saskatchewan	S.E. to N.E.
5. Battle River (Elbow) . .	S.E. to N.E.
6. Bow River (Junction with the South Branch) . . .	S.E. to N.E.

CHAP. XXXVII.

THE LAURENTIAN AND HURONIAN SERIES.

Distribution of Formations. — The Laurentides. —— THE LAURENTIAN SYSTEM.—Description of Laurentian Rocks.—Lime and Soda Felspar.—Titanic Iron-ore. — Crystalline Limestones. — Mineral Species in the Limestones. — Intrusive Rocks. — Economic Materials. — Separation of Laurentian Rocks into two Groups.—Extent of the Limestones in this System.—Area of Laurentian Rocks in the Basin of Lake Winnipeg.—Intrusive Rocks.—Character of the Dividing Ridge.—From Milles Lacs to Rainy Lake.—From Rainy Lake to the Lake of the Woods.—From the Lake of the Woods to the Winnipeg.—The Coast of Lake Winnipeg. — Fundamental Gneiss of Scotland, the Equivalent of the Laurentian Series in Canada.—Adoption of the name Laurentian in British Geology by Sir Roderick Murchison, to represent the Oldest or Fundamental Gneiss of Scotland. — The Huronian Series. — Description of Huronian Rocks.

DISTRIBUTION OF FORMATIONS.

THE distribution of series of formations in the order of their occurrence from east to west in the basin of Lake Winnipeg is as follows : —

1. Laurentian Series.
2. Silurian ,,
3. Devonian ,,
4. Carboniferous* ,,
5. Cretaceous ,,
6. Tertiary ,,

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* Although this series has not been recognized on the east side of the fossiliferous rocks in the Basin of Lake Winnipeg, yet the occurrence of a *Productus* in a boulder in the bed of Red River affords presumptive evidence that the series is represented there. I have therefore placed it provisionally in the enumeration given above.

THE LAURENTIAN SERIES.

The origin of the name Laurentian and the character of the rock series which compose this system is described by Sir William Logan and Mr. Hunt in the following extract from a "Sketch of the Geology of Canada."

THE LAURENTIDES.*

"The province of Canada is traversed, through its whole length, by a mountainous region dividing it into two basins, which may be distinguished as the northern and the southern basins. These mountains, which have been named the Laurentides, form the north shore of the St. Lawrence, from the gulf as far as Cape Tourmente, near Quebec; from which point they leave the river, and while they follow its general direction become more and more remote, until near Montreal, they are at a distance of ten leagues from the St. Lawrence. Going further westward, this mountainous region follows the line of the Ottawa, and crosses this river near the *Lac des Chats*, fifty leagues from Montreal. Thence taking a southward direction, it reaches the St. Lawrence near the outlet of Lake Ontario, and from this point running north-westward, the southern limit of this formation, reaches the south-eastern extremity of Lake Huron, at Matchedash Bay, and forms the eastern shore of the lake as far as the 47th degree of latitude, where quitting this lake, the formation gains Lake Superior, and extends in a north-west direction to the Arctic Sea.

"To the south of the St. Lawrence, this same region covers a considerable space between the Lakes Ontario and Champlain, and constitutes the Adirondack Mountains. With this exception, and perhaps also a small exposure in Arkansas and another near the sources of the Mississippi, this formation is not found to the south of the St. Lawrence, and as it belongs especially to the valley of this river and constitutes the Laurentide Mountains, the Geological Commission of Canada has distinguished it by the name of the *Laurentian system.*"

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* A Sketch of the Geology of Canada, serving to explain the Geological Map and Collection of Economic Materials sent to the Universal Exhibition at Paris, 1855, by W. E. Logan, F.R.S., and T. Sterry Hunt, A.M.

THE LAURENTIAN SYSTEM.

"The rocks of this system are, almost without exception, ancient sedimentary strata, which have become highly crystalline. They have been very much disturbed and form ranges of hills, having a direction nearly north-east and south-west, rising to the height of 2,000 or 3,000 feet and even higher. The rocks of this formation are the most ancient known on the American continent, and correspond probably to the oldest gneiss of Finland and Scandinavia and to some similar rocks in the North of Scotland.

"The rocks of the Laurentian formation are in great part crystalline schists, for the most part gneissoid or hornblendic. Associated with these schists, are found large stratified masses of a crystalline rock, which is composed almost entirely of a lime and soda felspar. The rock is sometimes fine grained, but more often porphyritic, and contains cleavable masses of felspar, sometimes several inches in diameter; these felspars are triclinic, and have ordinarily the composition of andesine, labradorite, anorthite, or of intermediate varieties. Their colours are various, but the cleavable felspars are generally bluish or reddish, and often give coloured reflections.

Hypersthene is very generally disseminated in these felspathic rocks, but always in small quantity. Titanic iron-ore is also found in them, in a great number of places, sometimes in small grains, but often in considerable masses.

"With schists and felspars are found strata of quartzite, associated with crystalline limestones, which occupy an important place in this formation. These limestones occur in beds of from a few feet to 300 feet in thickness, and often present a succession of thin beds intercalated with beds of gneiss or quartzite; these latter are sometimes quartzite conglomerates, and have in certain cases a base of dolomite. Associated with these limestones, are sometimes found beds composed in great part of wollastonite and of pyroxene, species which evidently owe their origin to the metamorphism of siliceous limestones. Beds of dolomite and limestone more or less magnesian, are often interstratified with the pure limestones of this formation.

"The limestones of this system are rarely compact, and most frequently are coarsely granulated. They are white or reddish, bluish or greyish, and these colours are often arranged in bands which coincide with the stratification. The principal mineral species met with in these limestones, are apatite, fluor, serpentine, phlogopite, scapolite, orthoclase, pyroxene, hornblende, wollastonite, quartz, idocrase, garnet, brown tourmaline, chondrodite, spinel, corundum, zircon, sphene, magnetic and specular iron, and graphite. The chondrodite and graphite are often arranged in bands parallel with the stratification. Beds of a mixture of wollastonite and pyroxene are sometimes met with, which are very rich in zircon, sphene, garnet, and idocrase. The most crystalline varieties of these limestones often exhale a very fetid odour when bruised. The limestones of this formation do not yield everywhere well crystallized minerals; near the Bay of Quinté there are beds met with which still preserve the sedimentary character, and show only the commencement of metamorphism.

"The conditions in which they are sometimes found, indicate that the agents which have rendered these limestones crystalline, have been such as to render the carbonate of lime almost liquid, and that, while in that state, it has undergone great pressure. As evidence of this opinion, we find that the limestone often fills fissures in the adjacent siliceous strata, and envelopes the detached, and often folded fragments of these less fusible beds precisely like an igneous rock.

"The crystalline schists, felspars, quartzites and limestones which we have described, make up the stratified portion of the Laurentian system, but there are besides, intrusive granites, syenites and diorites, which form important masses; the granites are sometimes albitic, and often contain black tourmaline mica in large plates, zircon, and sulphuret of molybdenum.

"Among the economic minerals of this formation, the ores of iron are the most important, and are generally found associated with the limestones."

In 1857 Sir William Logan read a paper before the American Association for the Advancement of Science, in which he referred to a former indication of a "probable separation of the Laurentian rocks of Canada into two great groups: that characterized by the presence of much lime and that without;" but from recent investigations (previous to August, 1857) it has appeared to him "almost certain that the former of these two great groups will be capable of subdivision, and that some of its bands of limestone, with their associate strata, are of a sufficient importance to be represented separately on the map."* At the meeting of the same body in 1859, Sir William Logan exhibited a map on which was delineated in detail the distribution of some of the bands of crystalline limestone interstratified with the gneiss of the Laurentian rocks on the north side of the Ottawa river, about forty miles from Montreal, being a continuation of the work referred to at the Montreal Meeting in 1857. Two additional bands of limestone had been ascertained to underlie the lowest of those previously examined, the whole of the strata associated with these lower three, including the limestones, being supposed to be about 15,000 feet thick.†

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* Canadian Journal, January, 1858.

† Until lately the Potsdam sandstone has been supposed to represent the epoch when organic life was first introduced by the Creator on the surface of our globe. Recent discoveries tend to throw back the first peopling of the world into a past so indefinitely remote, that all preconceived ideas of organic history become unsettled and at fault. The following notice is from *The Canadian Naturalist and Geologist*, vol. iv. p. 300:—

"Although the Laurentian Series has hitherto been considered azoic, a search for fossils in them has not been neglected. Such search is naturally conducted with great difficulties. Any organic remains which may have been entombed in these limestones, would, if they retained their calcareous character be almost certainly obliterated by crystallization, and it would be only through their replacement by a different mineral substance that there would be a chance of some of the forms being preserved. No such instances had been observed on the investigation of the Rouge and its vicinity, but from another locality in the Laurentian formation, Mr. John McMullen, one of the explorers of the Geological Survey, had obtained specimens well worthy of attention. They consisted of parallel or apparently concentric layers resembling those of the coral Stromatocerium, except that they anastomose at various parts; these layers consist of crystalline pyroxene, while the interstices are filled with crystallized carbonate of lime. These specimens had recalled to recollection others which had been obtained from Dr. Wilson of Perth some years ago, and had not then been regarded with sufficient attention. In these similar forms are composed of green serpentine, concretionary, while the interstices are filled with white dolomite. If it be supposed that both are the result of mere unaided mineral arrangement, it would seem strange that identical forms should result from such different

The crystalline limestones in the Laurentian series are daily acquiring increased importance. In the Report for the year 1858, recently issued, Sir William Logan states that in the present state of the investigation there appears to be a sequence of four important bands of crystalline limestone in the Laurentian area examined; but the wrinkled condition of the strata is such that in a space of not more than fifty miles by twenty, one of the bands exhibits an outcrop exceeding two hundred miles in length, which renders it very difficult to determine with precision the volume of rock in which the four calcareous bands are enclosed. The following is Sir William

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minerals in places so far apart. If the specimens had been obtained from the altered rocks of the Lower Silurian series there would have been little hesitation in pronouncing them to be fossils. The resemblance of these forms to Stromatocerium from the Bird's-eye limestone, when the coral has been replaced by concretionary silica, is very striking. In the pyroxenic specimens, the pyroxene and the carbonate of lime being both white, the forms, although weathered into strong relief on the surface, are not perceptible in fresh fractures until the fragments are subjected to an acid, the application of which shows the structure running throughout the mass. Several specimens of these supposed fossils were exhibited to the section."

The suppositions embodied in the foregoing extract do not coincide with the views relating to the origin of life expressed by Sir Roderick Murchison in the proceedings of the Geological Society for November, 1859, p. 219. The Cambrian rocks referred to, rest on the fundamental gneiss or Laurentian rocks of the North Highlands of Scotland:—

"The phenomenon relating to these Cambrian sandstones which may well strike the geologist as he passes over the summits of Suilven and Queenaig, is that these very ancient rocks, on which unquestionably the Lower Silurian rocks repose, should be simply sandstones and grits, which have undergone much less change than the sandstone which lies upon them,—the latter having been metamorphosed into quartz-rock. However difficult it may be to account for this fact, it is at all events *most instructive as regards the origin and succession of life in the crust of the earth,* and sustains my view of a beginning. For here (and I have applied the same argument before to the Cambrian sandstones of the Longmynd, which certainly underlie the quartz-rock of the Stiper Stones) the older of the two rocks in Scotland has offered no trace of fossils, whilst the more crystallized structure above exhibits unmistakable signs of former living things."

Logan's approximate estimate of the thickness of the various constituent parts of the mass, arranged in ascending order:—

	Feet.
1. Gneiss	5,000
2. Crystalline Limestone	1,500
3. Gneiss	4,000
4. Crystalline Limestone	2,500
5. Gneiss	3,500
6. Crystalline Limestone	750
7. Gneiss	5,000
8. Crystalline Limestone	500
Total	22,750

The area occupied by the Laurentian series in the Basin of Lake Winnipeg is indicated on the geological map. The country between Lake Superior and the Height of Land has been described by Mr. Alexander Murray, of the Canadian Geological Commission *; the geology of Rainy Lake and of the Lake of the Woods by Dr. Bigsby †; the country on the Pigeon River route by Dr. Norwood ‡; and a general view of the whole country between Lake Superior and Lake Winnipeg by Dr. Hector §, &c.

The intrusive rocks, so numerous throughout the vast extent of this series in the region under review, consist of granites, syenites, greenstones, trap, &c. In Great Dog Lake mica schist rests on each side of syenite outbursts, which have the form of promontories jutting into the lake on the west coast. The valley of Dog River is bounded by low granite ridges which acquire greater

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* Report of Progress, 1846.

† "On the Geology of Rainy Lake, South Hudson's Bay," by Dr. J. J. Bigsby, F.G.S. &c.—*Quarterly Journal* of the Geological Society, 1854. Also "On the Geology of the Lake of the Woods," by the same author.—*Quarterly Journal*, 1852.

‡ Geological Survey of Wisconsin, &c.

§ Papers Relative to the Exploration of British North America, by Captain Palliser.—*Blue Book*, 1859.

altitude and breadth at the Height of Land. A similar disposition obtains at Milles Lacs on the western slope, where the elongated dome-shaped intrusions are about 100 feet high and flanked with schists.

On the Pigeon River route the granite and syenite ranges acquire more imposing altitudes, sometimes attaining an elevation of nearly 1300 feet above Lake Superior, but the axis of each range preserves a general N.E. and S.W. direction parallel to the coast of the lake. This uniform disposition is maintained as far as Basswood Lake on the southern route.

The mountain range constituting the Height of Land dies out in a great measure after crossing the St. Louis River in its course south-west; but granitic, metamorphic, and trap rocks are met with at various points along the line of bearing as far as the Mississippi, and reappear again on the Minnesota river.*

At Snake Falls, on the northern route, the river passes over a schist highly inclined to the N.E., and below them, many fine exposures of the same schist occur on islands, frequently projecting like the end of boards of unequal lengths leaning against one another, and varying in thickness from two to five inches. Three miles below Snake Falls, the rock passes into gneiss, and numerous veins and dykes of granite are seen to penetrate it nearly at right angles to the strike; the dip is here N.W. Ten miles below Snake Falls, mica schist again comes into view, intersected with quartz and felspar bands from one to two inches thick. The strike is E. 5° N., and the dip nearly vertical. At the Grand Falls of the Nameaukan, the schists are tilted by steps in the form of the segment of a circle. In Lac Nameaukan, dome-shaped granitic islands parallel to one another, and of oval form, present themselves not far from the entrance of Lac La Croix. The direction of the longest axis is N. 60° W. A line prolonged through the granitic islands, in a N.W. direction, touches the schists about three hundred yards further on. Their apparent dip, as seen from the lake, was N.W., at an angle of about 45°. One island, wholly composed of schist, inclined at a high angle, is followed at a distance of about fifty yards by a long flat gneissoid dome. About six hundred yards from the island, the schists dip lightly to the S.E. On the north side, the dip could not be seen; but on the west side they were observed to bend round in a curved form, and from a N.W. dip towards the S.E. On the next island, the gneiss was intersected by numerous joints having a direction N. 70° E., and by quartz and felspathic veins, bearing N. 25° W., or nearly perpendicular to the former. Its surface towards the N.W. by W. was smooth, and inclined at an angle of about 10°. The rock of the Nu Portage is a granite containing mica in plates, and everywhere dotted with numerous beautiful specimens of plumose mica.

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* Dr. Norwood.

Dr. Bigsby thus sums up the geological conditions of Rainy Lake where a change in the direction of the strike is very decided.

"Chloritic and greenstone slates, gneiss and mica slate, in proportional quantities in the order here set down, seem once to have occupied the lake basin, with an E.N.E. strike, and a N.N.W. dip at a high angle usually; but subsequently a very extensive outburst of granite, with some syenite, has taken place to the great disturbance of the stratified rocks, and penetrating them both in intercalations and crosswise; these intrusive rocks occupy a very large portion of the lake."

He divides the region of Rainy Lake for convenience of description and reference, into six distinct parts, each having its own geological characteristic. The west shore of the lake is mainly occupied by granite, which at the northern portion is finely granular, and porphyritic in equal quantities. On the east coast of its north-westerly extension, are chloritic and greenstone slates; on the eastern arm of Rainy Lake, pale red granite is the prevailing rock, and near the northern extremity of this arm, naked ridges, white as porcelain, and 500 feet high, occur.

In the Lake of the Woods the Laurentian series is separated into two parts by a range of intrusive granite running in an E.S.E. direction from the north-west corner of the lake, as far east as Rainy Lake. The inclined metamorphosed strata on the north side of this granitic anticlinal dip W.N.W.; on the south side to the S.S.W. a direction resulting from the form and position of the intrusive rock.*

The country between the sources of the Winnipeg, and a few miles south of Islington Mission, a distance of nearly thirty miles, appears to be largely occupied by a vast range of intrusive granite and syenite, in the form of dome-shaped hills, varying from 150 to 200 feet high. A view from the summit of one of the highest of these, about fifteen miles due north from Rat Portage presented an unvarying succession of their rounded summits as far as the eye could reach in a westerly direction. The canoe route pursued in 1851 was a short Indian path from Rat Portage to the Great Winnipeg, in a nearly straight north-westerly direction. The country traversed was characterized by great sterility, and an unusual proportion of bare rock. High precipitous mural cliffs, without a trace of stratification observable in them, often formed the boundaries of this branch of the Great Winnipeg.

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* See Dr. Bigsby, "On the Geology of the Lake of the Woods," before referred to.

The series composing the country east of Rainy Lake towards the Height of Land are again reproduced after passing the large area of intrusive granite on the Winnipeg, and continue with some considerable variations of strike and dip occasioned by intrusions, as far as the first falls below the Bonnet Portage, where drift clays conceal the rocks on the banks of the river to its mouth, exposures occurring only at the different falls and portages.

The Laurentian rocks which form the whole of the low east coast of Lake Winnipeg strike off at its north-east corner, and passing to the north of Moose Lake, go on to Beaver Lake.*

The only exposure of Laurentian rocks seen within the area explored west of Lake Winnipeg were observed in St. Martin Lake; they have been described in Chapter XXVI.

In the Quarterly Journal of the Geological Society for August, 1860, Sir Roderick I. Murchison made the following interesting and important announcement respecting the age of the *Fundamental* Gneiss of Scotland, and conferred an appropriate acknowledgment of the services rendered to geology by the distinguished director of the Survey in Canada, by adopting a Canadian geological name for the British rocks of the same age as those which Sir William Logan has named the Laurentian System.

"The changes which are involved in the adoption of my views of the order of succession are, it will be admitted, considerable. In the first place, by showing that mountain masses of sandstone and conglomerate lie unconformably beneath quartzose and calcareous rocks with true Lower Silurian fossils, we know that the former must be of Cambrian age. We further learn that the old or fundamental gneiss, which lies beneath such Cambrian sandstone, and is entirely unconformable to, and independent of it, is a lower stratified rock than any hitherto recognized in the British Isles. The beginning of the geological alphabet, as applied in the Maps of the Geological Survey to the Cambrian rocks of England, Wales, and Ireland, must therefore be preceded in Scotland by the first letter of some alphabet earlier than the Roman, showing a still lower deep in the north-west of Scotland (as in North America) than exists in England, Wales, or Ireland.

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* Sir John Richardson's Journal of a Boat Voyage, &c., p. 49. Am. Ed.

"If this most ancient gneiss required a British name, it might indeed with propriety be termed the 'Lewisian System,' seeing that the large island of the Lewis is essentially composed of it, capped here and there by derivative masses of Cambrian conglomerate; but the term 'Laurentian' having been already applied to rocks of this age in North America by our distinguished associate Sir W. Logan, I adhere to that name, the more so as it is derived from a very extensive region of a great British colony."

THE HURONIAN SERIES.

The Huronian series has not been recognized in the basin of Lake Winnipeg, but as it rests unconformably on the Laurentian rocks for a distance of nearly 500 miles on the shores of Lakes Superior and Huron, occurring both on the north and south shores of the first-named lake, it is not improbable that it will be found to exist in the Winnipeg Basin. In Canada it contains very important metalliferous veins, particularly of native copper. The following description of the Huronian or Cambrian system is from the little work before referred to.*

"The shores of Lakes Huron and Superior offer a series of schists, sandstones, limestones, and conglomerates interstratified with heavy beds of greenstone, and resting unconformably upon the Laurentian formation. As these rocks underlie those of the Silurian system, and have not as yet afforded any fossils, they may probably be referred to the Cambrian system (lower Cambrian of Sedgwick). the schists of this system upon Lake Superior are bluish in colour, and contain beds of cherty silex, marked by calcareous bands, and holding anthracite in its fissures.

"These are covered by a considerable thickness of trap, upon which repose massive beds of red and white sandstone which sometimes becomes conglomerate and contains pebbles of quartz and jasper. Beds of a reddish argillaceous limestone are often interstratified with these sandstones, which are intersected and overlaid by a second eruption of greenstone of great thickness and columnar in its structure. This formation, which, according to the observations of Sir William Logan, has, on Lake Superior a total thickness of about 12,000 feet, is traversed by a vast number of trappean dykes.

"In the corresponding formation on the north shore of Lake Huron, the sandstones are more vitreous and the conglomerates more abundant than on Lake Superior; they are, however, associated with conglomerates and schists similar to those we have just described, and the formation offers great intercalated masses of greenstone. A band of limestone, fifty feet in thickness, forms a part of this series, to which Sir William Logan assigns a thickness of about 10,000 feet. He has shown the occurrence, after the irruption of the interstratified greenstones, of two systems of trap dykes, and a third of granite, intermediate in time between the two irruptions of trap. The formation of the metalliferous veins is still more recent. The principal mineral species of these veins are native copper, quartz, calc-spar, dolomite, fluor, and sulphate of baryta, with several zeolites, of which laumonite is the most common, heulandite, stilbite, thompsonite, apophyllite and analcime are also met with, as well as prehnite and datholite. These veins are only metalliferous where they traverse the beds of greenstones."

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* A Sketch of the Geology of Canada, &c., by Sir William Logan and Mr. Hunt.

CHAP. XXXVIII.

THE SILURIAN AND DEVONIAN SERIES.

Rim of the Silurian Series.—Distribution of Formations.—The Chazy Formation.—Fossils from the Chazy, *Modiolopsis Parviuscula, Orthoceras Simpsoni.*—Bird's-eye, and Trenton Formations.—Hudson River Formation.—The Devonian Series.—Salt Springs.—Salt Springs in Rupert's Land.—Manufacture of Salt.—Salt Trade of the United States.—Fossils from Devonian Rocks in the Winnipeg Basin.

THE SILURIAN SERIES.

THE rim of the great southern fossiliferous basin in North America touches Fond du Lac, the western extremity of Lake Superior.* From this point it makes a bend to the south, and then turning north-westerly comes upon the Mississippi river near its source. The prolongation of the great granitic axis separating the waters flowing into Lake Superior, from those tributary to Lake Winnipeg, penetrates for a considerable distance into the fossiliferous basin, in the northern part of the State of Minnesota, but although the subjacent rock is concealed by drift, the general character of the country, as far as Red Lake, leads to the inference that it is underlaid by the Silurian series. From Red Lake the rim pursues a northerly course to the mouth of Rainy River; it underlies the valley of Rainy River, as far as Rainy Lake, in the form of a narrow and very elongated bay.* Sweeping round the south and part of the west coast of the Lake of the Woods, it leaves that body of water and comes on the Winnipeg, above Fort Alexander. The south and west coasts of Lake Winnipeg, and as far as its north-east corner mark the easterly boundary of this basin; it then passes north of Moose Lake, to Beaver Lake, and thence in a north-westerly direction towards and beyond Methy Portage. The Silurian rocks of Great Slave Lake and River present forms chiefly belonging to the upper division of the series. The occurrence of brine springs in that region points also to the proximity of Devonian rocks, which are particularly characterized by brine springs in the basin of Lake Winnipeg. The upper Silurian rocks of the Arctic Archipelago rest everywhere on granitoid rocks with a remarkable red sandstone passing into coarse grit for their base.†

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* Sandstones belonging to the Potsdam and Chazy formations, the lowest members of the fossiliferous rocks in America, are in great force on the south shore of Lake Superior. The basin of the lake is chiefly excavated in the Potsdam sandstone.

Limestones, sandstones, and shales of Silurian age are exposed from the Grand Rapid of the Saskatchewan to Big Black Island, near the south extremity of Lake Winnipeg. From Big Black Island to the rapids on Red River the formations are concealed by quaternary deposits. On the south-east coast limestone is occasionally seen in position, but its junction with the Laurentian series near the mouth of the Winnipeg is concealed by drift.

The formations which have been recognized on Lake Winnipeg, and in the valley of Red River, are

1. The Chazy Formation.
2. The Bird's-eye ,,
3. The Trenton ,,
4. The Hudson River Group.

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* See "Geology of the Lake of the Woods."—Dr. Bigsby, Quart. Journ. Geo. Soc. vol. viii. p. 406.

† Rev. Samuel Haughton, F.R.S., Appendix to Capt. M'Clintock's Narrative.

CHAZY FORMATION.

Fine exposures of the Chazy formation occur on Deer Island, Punk Island, and along the west coast of the lake north of Big Grindstone Point as far as the Cat Head. They appear in the form of cliffs, varying from twenty-five to forty-five feet in altitude at nearly all points and promontories. The character of the rock is described in Chapter XXIII. At the Narrows the three limestone promontories, the Bull's Head, Limestone Cave Point, and Whiteway's Point, approach within a few miles of the Laurentian series on the east coast. The strait from Whiteway's Point to the Dog's Head is not more than three miles across. Before this narrow channel was excavated, Lake Winnipeg must have been divided into two parts, like Lakes Manitobah and Winnipego-sis, and it is not improbable that near the Dog's Head a rapid river or falls formerly existed. The relation of the two lakes would then resemble the present relation of Lake Manitobah, the Little Saskatchewan and Lake Winnipeg.

The following enumeration and description (between brackets) of fossils forming part of my collection from the Silurian and Devonian rocks of this region, are from the pen of Mr. E. Billings, F.G.S., Palæontologist to the Canadian Geological Survey.

Plantæ.

[Two species of Fucoids from Punk Island in Lake Winnipeg, resembling forms which occur in the Chazy sandstone.

Zoophyta.

The only coral is a species allied to *Columnaria alveolata.* It is from Grindstone Point, Lake Winnipeg.

Echinodermata.

Columns of a large *Glyptocrinus* allied to *G. ramulosus* occur at Punk Island and Grindstone Point; and besides these, at the latter locality were found several plates of a *Glyptocystites* closely allied to *G. multiporus.*

Brachiopoda.

Two specimens of a plaited *Rhynconella* a little smaller than *R. plena* were found at Punk Island.

Lamellibranchiata.

MODIOLOPSIS PARVIUSCULA. (N. S.)

This species closely resembles *M. modiolaris* (Conrad) but is always much smaller. It is transversely elongate, anterior extremity small, rounded half the width of the posterior; the latter obliquely truncated and somewhat straight from the end of the hinge line for rather more than half the width, then rounded at the lower posterior angle. Hinge line straight or a little arched, full three-fourths the whole length of the shell. The umbones are less than one-fifth the length from the anterior extremity. The valves are moderately convex, obscurely and obliquely carinate from the umbones towards the lower posterior angle. In many specimens the ventral margin is concave near the anterior extremity, as if for the purpose of a byssus. Surface with obscure concentric undulations of growth. Length of large specimen, one and a half inch. In general they are a good deal smaller.

This shell so much resembles *M. modiolaris* that I have long hesitated as to the propriety of giving it a separate name. It is very widely distributed, since we have specimens from Lake Winnipeg at Punk Island, from the Pallideau Islands in Lake Huron, where it occurs in strata which hold fossils of the Chazy, Black River and Trenton limestones, and from near Cornwall and the Island of Montreal in the Chazy.

Besides the above there are several small nearly circular fossils from Punk Island, which appear to be casts of some lamellibranchiate shell.

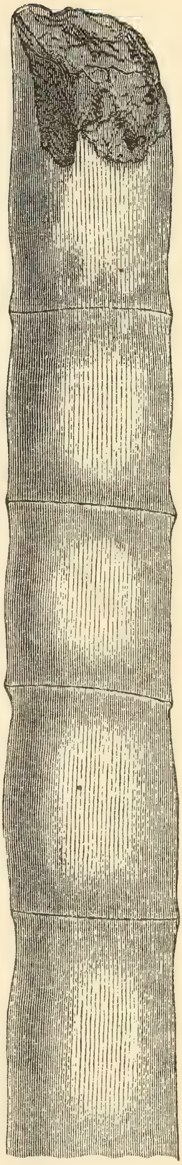
Gasteropoda.

Trochonema umbilicata (Hall, Sp.) This species occurs at Lake Winnipeg and at the Little Saskatchewan in considerable numbers. A species allied to *Pleurotomaria rotuloides* (Hall) is common at Punk Island, and a *Maclurea* allied to *M. Logani* (Salter), but with more slender whorls was found at Punk Island and the Little Saskatchewan. One of the specimens has the operculum in place, but is destitute of the shell and somewhat distorted. None of the Gasteropoda have the shell preserved.

Cephalopoda.

ORTHOCERAS SIMPSONI. (N. S.)

The specimen is a portion of the siphuncle, nine inches and one-fourth in length, eleven lines in diameter at the larger extremity, and ten at the smaller. It is nearly cylin-



ORTHOCERAS SIMPSONI.
A fragment of the siphuncle of this species.

drical with a broad, shallow constriction above and below each of the narrow annulations which mark the attachment of the septa. There are eight of those septal rings at the following distances from each other, commencing at the smaller extremity :—Between the 1st and 2nd, fourteen lines; 2nd and 3rd, twelve lines; 3rd and 4th, ten and a half lines; 4th and 5th, thirteen and a half lines; 5th and 6th, fifteen lines; 6th and 7th, thirteen and a half lines; 7th and 8th, twelve and a half lines. The annulations are nearly at right angles to the length, and we must infer from this fact either that the septa are scarcely at all concave, or that the siphuncle must be central, or very nearly so. If in an orthoceratite the septa are flat, then no matter whether the siphuncle be central or not, the septal annulations must be at right angles, but if the septa are concave then the annulations will be oblique if the siphuncle be at all removed from the centre. My impression is, that this is a large orthoceratite with distant septa and a nearly central siphuncle since the annulations have a scarcely perceptible obliquity.

It is one of those species in which the siphuncle became gradually filled with a solid calcareous animal secretion, with the exception of a narrow cylindrical channel along the centre. This central canal is clearly indicated in the specimen, and has a diameter of nearly two lines.

Dedicated to Sir George Simpson, Governor of the Hudson's Bay Company.

Locality and formation.—Cat Head, Lake Winnipeg, supposed to be Silurian.

A small serpulite appears to be common at Punk Island; it much resembles the large species of the Chazy limestone.

The occurrence of *M. parviuscula*, *H. umbilicata*, the

Maclurea, and *Glyptocystites* are quite sufficient to show that the localities where they have been collected are Lower Silurian, and most probably about the age of the Black River and Chazy limestones.]

THE BIRD'S-EYE AND TRENTON FORMATIONS.

The whole of the coast on the north-west side of Lake Winnipeg is represented by Sir John Richardson to be occupied by the Bird's-eye Limestone.* Near the first and second Rocky Points the strata contain many gigantic orthoceratites which have been described by Mr. Stokes in the Geological Transactions.†

In Pine Island Lake, there are exposures thirty feet in altitude, containing *Orthocerata* and *Receptaculites Neptunii*.‡ The strike is south-west by west, being at right angles to the general direction of the Laurentides.

THE HUDSON RIVER FORMATION.

This formation appears in cliffs five-and-twenty feet high at the Stone Fort, Red River. It is also exposed near the rapids. Most of the forts and churches in the settlements are constructed of stone from this rock. The colour of its weathered surface is a pale yellowish grey, but of fresh surfaces, a white gray. Dr. Owen, who visited the Red River Settlements in 1848, enumerates the fossils he found near the Stone Fort in his Report published in 1852. He says:—

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* "As bearing on the resemblance of these (Silurian) quartzose and calcareous rocks to their equivalents in America, I may mention that a recent comparison of several of the American so-called fucoids has enabled Mr. Salter satisfactorily to refer them in many cases to the vertical tubes, or rather filled-up burrows, of large marine worms. He particularly cites the *Phytopsis tubulosus* of the 'Calciferous Sand-rock' of the American geologists; the celebrated 'Birds' Eyes' (*Phytopsis cellulosus*) of the 'Birds'-eye Limestone,' and the *Buthotrephis succulens* of the Trenton group, as being of this nature. The part played by annelides in the older palæozoic epoch was, we thus know, very conspicuous."—*Sir R. I. Murchison, Quar. Jour. Geol. Soc.*, Aug. 1860.

† Journal of a Boat Voyage through Rupert's Land.

‡ Ibid.

"About twenty miles below the mouth of the Assinniboine, near lower Fort Garry, solid ledges of limestone are exposed of a light buff colour, sometimes mottled, spotted, or banded with light brown. Immediately opposite the Fort, a considerable amount of rock has been quarried, and used in the construction of the building. In these beds, I succeeded in finding several well-defined and characteristic fossils, sufficient to establish, without the least doubt, the age of the Red River limestones.

They are: *Favosites basaltica; Coscinopora Sulcata;* hemispherical masses of *Syringopora; Chœtetes lycoperdon;* a *Conularia;* a small, beautiful undetermined species of *Pleurorhynchus; Ormoceros Brongniarti; Pleurotomaria lenticularis (?); Leptæna alternata; Leptæna plano-convexa (?); Calymene senaria;* and several specimens of the shield of *Illænus crassicauda.*

Many of these are identically the same fossils which occur in the lower part of F. 3, in Wisconsin and Iowa, in the blue limestones of Indiana, Ohio, Kentucky, and Tennessee, and also in the lower Silurian of Europe.

The *Coscinopora* is precisely the same as the coral, which is particularly characteristic of the lower beds of the upper magnesian limestone of Wisconsin. The specimens of *Favosites basaltica* cannot be distinguished from those which abound in the upper magnesian limestones of Wisconsin and Iowa, and the lower coralline beds of the Falls of the Ohio. It is also worthy of note that these limestones of Red River, like their equivalents in Iowa and Wisconsin, are highly magnesian, containing from seventeen to forty per cent. of the carbonate of that alkaline earth."

* * * * * * *

"On the south shore of that lake (Winnipeg), however, I again had an opportunity of inspecting fossiliferous limestones in *situ.* At the two localities where I succeeded in obtaining a view of them, they were much disturbed, dipping either at a high angle, or standing vertically. On Poplar Point, they are quite thin-bedded, and contain, besides small *Entrochites*, large varieties of *Endoceras.* In a small bay, near Big Swamp Point, the limestone is seen jutting out beneath heavy, loose masses of crystalline rocks, some of which weigh hundreds of tons. The surfaces of many of the limestone slabs at this locality are crowded with well-preserved specimens of the characteristic fossil *Leptæna alternata.*"

THE DEVONIAN SERIES.

In consequence of the extreme flatness of the country the junction of the Silurian and Devonian Series has been only approximately determined, chiefly by the occurrence of the saline springs which distinguish the Devonian Series in this region. In all cases where saline springs were seen issuing from rock in position, Devonian formations were recognized by characteristic fossils. The parallelism between the courses of Moss River, Waterhen River, Partridge Crop River, and Dauphin River, suggests at once the line of junction or a dislocation; if the former, their courses probably indicate the junction of different Devonian or Silurian formations, but in no instance the limits of either series, as was ascertained by the characteristic fossils found at different localities on those rivers.

In 1823, Mr. Keating* noticed the salt springs in Minnesota State and Dakotah Territory, far south of the boundary line. Even at that early period in the history of the settlements on Red River, 500 dollars were earned by one individual during one winter from the sale of the salt he had manufactured from springs near Pembina. The price of salt in the settlement was then six dollars per barrel weighing eighty pounds. At a spring on Saline River, south of the boundary line, Major Long's party found the *Salicornia herbacea* growing very abundantly around it. "Mr. Schweinitz states, on the authority of Mr. Nuttall, that this is the only inland locality of this plant, besides the Onondaga Salt springs in the State of New York." The bottom of shallow lagoons containing brine on Winnipego-sis Lake were thickly covered with a soft and wavy carpet of a species of *Naius.*

In the valley of La Rivière Sale, salt springs are very numerous, and the ground in their vicinity is frequently covered with a thick incrustation. Many years since the half-breeds of the settlement used to collect salt from this valley for domestic purposes. The names Saline Creek and Salt Point on Red River, north of the 49th parallel, were given in consequence of springs strongly impregnated with salt occurring there, but south and west of Stony Mountain no rocks in position have been observed east of Pembina Mountain. The whole country is nearly horizontal, having a mean elevation of about 100 feet above Lake Winnipeg.

Subjoined is a table showing the localities, north of the 49th parallel, where salt springs occur, distinguishing between springs from which salt has been and has not been manufactured or collected as a crust on the surface of the ground:

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* Major Long's Expedition to the Sources of St. Peter's River.

1.	Salt Brook	Red River.
2.	Salt Point	„
3.	La Rivière Sale	Collected from incrustations by the sides of springs. These incrustations are often two inches in thickness.
4.	Salt Point	Winnipego-sis Lake.
5.	Turtle River	Dauphin Lake—collected by Indians.
6.	Crane River	Manitobah Lake — collected by Indians.
7.	Monkman's Salt Works.*	Winnipego-sis Lake—manufactured by John Monkman.
8.	Swan River	Manufactured for H. B. Co.
9.	West Coast of Winnipego-sis Lake in many places.	
10.	West Coast of Lake Manitobah in many places.	
12.	The Pas Mountain.	

It has been already stated that the processes employed in the manufacture of salt in Rupert's Land are of the rudest description. By the employment of simple artifices the yield might be greatly increased, and its market value reduced to one-fourth the price it brings at the settlements. In the valley of La Rivière Sale, about twenty-six miles from Fort Garry, springs issue from the sides of the hills in positions very favourable for the employment of solar evaporation in shallow basins, which might be excavated at a lower level than the spring, and salt extracted without the employment of artificial heat; an immense advantage in a country where fuel is scarce and labour dear.

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* The bottom of the evaporating pans at Monkman's Works contained a thin stratum of an extremely hard substance, which subsequent examination showed to consist of silica, a little sulphate of lime, and a very considerable quantity of bromides.

In the State of New York between 500,000 and 600,000 bushels of salt are now made annually by solar evaporation. Wooden vats are employed, with movable roofs, so that the brine may be protected at the approach of unfavourable weather. The average daily supply of brine at these works during six months of the year is 2,000,000 gallons, and the cost per barrel of 300 lbs. is one dollar. Salt made by the boiling process weighs 56 pounds to the bushel, solar (that made by evaporation) salt 75 pounds. By the boiling process at Onondaga the cast iron kettles, holding from 50 to 70 gallons each, are disposed in double rows above suitable furnaces technically called "blocks." Each block contains from 50 to 70 kettles, and manufactures during eight months of the year from 20,000 to 25,000 bushels of salt.

In 1800 the number of bushels of salt made at the Onondaga Salt Works was 50,000; in 1810, 450,000 bushels; in 1830, 1,435,446 bushels; in 1840, 2,622,305 bushels; in 1850, 4,268,919 bushels; in 1857, 4,300,000 bushels; and in 1859, within a fraction of 7,000,000 bushels.

The strength of the brine is measured by a "Salometer," whose zero is distilled water, and maximum, water saturated with common salt, which is represented by 100. The brines of Onondaga vary from 76° to 44°. Wells which do not furnish brine above 50° are not considered worth working.

The sea-water at Nantucket gives a bushel of salt to every 380 gallons; at the salt springs of Zanesville, Ohio, 95 gallons furnish the same quantity of salt, while the old wells of Onondaga yield one bushel from 40 to 45 gallons, and the new wells at Syracuse the same quantity from 30 to 35 gallons of brine.* Mr. Donald Gunn, of Red River Settlement, says that in the dry season 24 gallons of brine from the Winnipego-sis springs will produce one bushel of salt.

The value of the salt trade in the United States may be inferred from the following statistics:—

	Bushels.
In 1840 the quantity of foreign salt imported was . .	8,183,203
In 1850 " " . .	11,224,185
In 1857 " " . .	17,165,704

The value of the foreign salt consumed in 1857 amounted to nearly 2,000,000 dollars, and the value of foreign and domestic salt exported from the States during the same year was 230,000 dollars.

The most eastern exposure of the Devonian Series, recognized by fossils of that age, occurs on Thunder Island, St. Martin Lake; the most westerly exposure is seen on Moss River, and it is between these two points that, as far as known, brine springs are most numerous. Barren areas surrounding brine springs are of frequent occurrence at the foot of the range of hills from the Riding Mountain to the Pas. In a country nearly horizontal, where the attitude of the rocks conforms to the general surface, it will be at all times very difficult to determine the precise line of junction between succeeding series, and fortunately in the present instance the brine springs, which undoubtedly have their source in Devonian rocks, afford an excellent guide in determining the outcrop and extent of the series.

As far as my observations enabled me to judge there is no difference in the general aspect of the country occupied by the Silurian and Devonian Series in this region. The rock of either age almost everywhere approaches the surface and is covered with a few inches of vegetable mould. Where fires have occurred the soil is burned away and the bare surface exposed. Very few areas of drift were seen, the most imposing being some low hills on St. Martin Lake. Denuding forces appear to have cut down the surface of the country to one nearly uniform level from the Riding Mountain ranges to the Laurentides. The upper extremity only of this excavated valley being covered many feet deep with quaternary deposits through which Red River, the Assinniboine and White Mud River have cut their channels.

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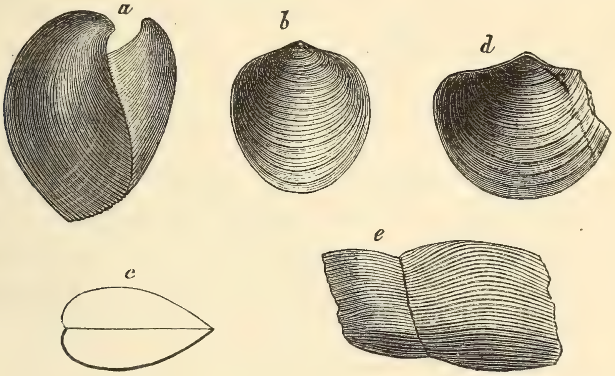
* The History, Commerce, Sources, Manufacture, and economical Value of Salt consumed in and exported from the United States; by William C. Dennis, of Key West, Florida. Patent Office Report, 1857.

The uninterrupted continuity of the rim of the Devonian rocks through the United States, Canada, Rupert's Land and the valley of Mackenzie River can scarcely be doubted. Its outcrop from the Atlantic to the Arctic Ocean would extend over sixty degrees of longitude and thirty degrees of latitude. The Devonian rocks in the valley of the Mackenzie River have many characteristics in common with those of Lake Winnipeg.

[The following are the fossils from Snake Island in Lake Winnipego-sis.

Atrypa reticularis (Linne) in abundance, both the common form with moderately coarse ribs and the more finely striated varieties, *Atrypa aspera* (Schlotheim). The specimens very closely resemble those figured by Professor Hall, in his new work, the "Geology of Iowa," plate vi. figs. 3, *a*, *b*, *c*, *d*, but are a little more pointed in front. A fine *Orthis* agrees well with the figures and descriptions of *O. Iowensis*, (Hall,) Geology of Iowa, plate ii. fig. 4; but is a little longer. The proportions are the same, but the length, breadth and depth are each two lines greater than the figures. Besides these there are fragments of several other Brachiopods, among which are two small species of *Productus*.



Fossils from Snake Island.

a, *Orthis Iowensis* (Hall) side view.
b, *Lucina occidentalis* (Billings).
c, *do.* *do.* Outlines of same, side view.
d, *Lucina elliptica* (Conrad).
e, *Loxonema nexilis* ?

The Lamellibranchiate shells are *Lucina elliptica* (Conrad) a species of the Corniferous limestone and Hamilton groups of Canada and New York, and a new species of the same genus, which I propose to call *L. occidentalis.*

Of Gasteropoda there are two species of *Euomphalus*, and a fragment of a *Loxonema*, most probably *L. nexilis.*

The Cephalopoda consist of fragments of *Orthoceras*, *Gomphoceras* and a species of *Nautilus* or *Gyroceras.*

Although we have none of the characteristic spirifers, corals, or trilobites to guide us, yet I think that upon the evidence of the above fossils we can safely say that this locality is Devonian, and most probably about the age of the Hamilton group.

The fossils from Manitobah Island are mostly the same as those of Snake Island, with the addition of two species of *Chonetes* and fragments of a large fish. There is also here a large *Stromatopora*, probably *S. concentrica.*

At Thunder Island, St. Martin Lake, the *Stromatopora* occurs, with abundance of a small *Strophomena* and some corals, not determinable.

Lucina Occidentalis. (*N. S.*)

Oval, length about one-ninth greater than the width, hinge line greatly convex, cardinal extremities obtusely rounded, anterior and posterior margins gently convex, sub-parallel ventral margin rounded or a little pointed in the centre; beaks central, small, pointed, incurved, nearly in contact with each other, and turned a little towards the anterior extremity; both valves moderately convex and marked with concentric undulations of growth.

Length of specimen, nine lines, width eight lines, depth of both valves, five lines. The greatest width is at about one-fourth the length below the beaks, from which level the margins converge but little, until within two-fifths of the length of the front, when they become more strongly curved.

Locality and Formation, Snake Island, Lake Winnipegosis. Devonian.]

CHAP. XXXIX.

THE CARBONIFEROUS SERIES. — JURASSIC FORMATION.

Evidence of the Carboniferous Series. — 'Productus.'—Probability of the Carboniferous Series being represented on the Flanks of the Riding Mountain.—Occurrence in Nebraska Territory.—In Kansas Territory.—In the North-West generally.—On the West Edge of the Fossiliferous Basin. — Ammonites from the McKenzie River, probably from Jurassic Rocks. —Ammonites Barnstoni.—Ammonites Billingsi.

THE CARBONIFEROUS SERIES.

The western limits of the Devonian Series are shown on the map to follow the boundary of the Great Cretaceous table-land so well defined by Pembina Mountain, Riding Mountain, Duck Mountain, Porcupine Hill, the Pas Mountain, and the high plateau similar to Pembina Mountain which stretches from the Pas to the Main Saskatchewan, near and below Fort à la Corne. The country at the base of this continuous boundary is uniformly horizontal, and while Devonian rocks in position were seen within thirty miles, and brine springs within ten miles of Cretaceous shales on the precipitous flanks of the Riding Hill Range, yet no evidence of any intermediate formation was visible.

During the ascent of the Riding Mountain, a very careful search was made for traces in the drift of the higher series, in the hope of obtaining evidence of the existence of Carboniferous rocks, but without success. The boulders, so numerous on the ridges and the successive terraces, were carefully examined, but they were found to be derived altogether from the Laurentian Series, the limestones of Lake Winnipeg or the superior Cretaceous shales.

The importance of any evidence of the Carboniferous Series in the Valley of Lake Winnipeg cannot be too highly estimated. A *productus* was given to me by a half-breed at Red River Settlement, who declared he procured it from "solid rock," which is known to occur in two places only in the valley of Red River, at the Stone Fort, and above, at and below the rapids, from which places both Dr. Owen and I obtained Lower Silurian fossils from rock in position. It is probable that the specimen figured below, was procured from a boulder; but boulders are brought *north* each year from Minnesota by the ice of Red River; it is therefore quite possible that the specimen was brought by ice from the *south.* Under any circumstances, its presence within thirty miles of the mouth of Red River is an important fact, and affords good ground for hope, that if the Carboniferous Series are not represented on the flanks of the Riding, Duck, and Porcupine Mountains, they will be found in the State of Minnesota, or

Productus?

SUPPOSED TO BE FROM CARBONIFEROUS LIMESTONE.

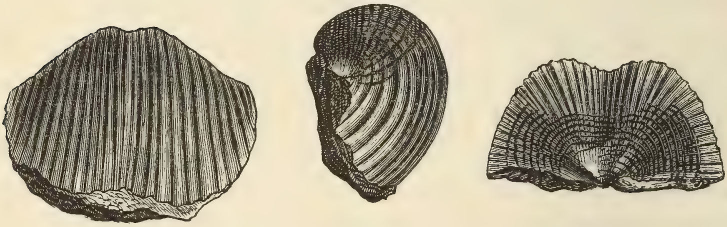


Fig. 1. Fig. 2. Fig. 3.

Fig. 1, Productus from Red River.
Fig. 2, ,, Side view.
Fig. 3, ,, Rostral extremity.

Dacotah, on the north side of the Height of Land, and in the valley of Red River.

[There is some evidence of the existence of at least a portion of the Carboniferous system in this region. The fossil procured from the half-breed, who said he collected it from "the solid" rock, at some place on the Red River, is a *Productus* of the group *Semireticulati*, all of which appear to be confined to the Carboniferous Series. The specimen is not worn and presents all the appearance of having been freshly broken from the rock.] *

The presence of fragments of any particular rock in the drift of Canada and elsewhere, affords presumptive evidence of the existence of the parent rock in position some distance to the north of the place where the detritus is found, but where the erratics occur in the bed of a river flowing to the north, in which ice of great thickness accumulates, and which moreover is subject to annual overflows, the evidence, under other circumstances, strongly presumptive, must in this case be received with great caution, and regarded rather as an encouragement to continue the search for the Carboniferous Series in both directions from which the boulder might have been carried.

If rocks occupying a position between the Devonian and Cretaceous Series exist on the flanks of the Riding Mountain, it is probable that traces would have been discovered in the drift. The space in which members of the Carboniferous Series or superior formations might occur, is narrowed down to a strip ten miles in breadth between the salt springs south of Dauphin Lake and the outcrop of the Cretaceous shales on the flanks of the mountain.

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* The following label was attached to this specimen, "Given to me by a half-breed, who declared he picked it from 'solid rock' in Red River."

(Doubtful.) H. Y. H.

At least seven miles of this distance is so nearly horizontal that it does not rise twenty feet above Dauphin Lake, and the dip of the Devonian strata is uniformly at a very small angle to the south-west, where exposures were seen on Manitobah Lake. (Small local deviations from a uniform dip on Snake Island and Moss River are noticed in Chapters XXIV. and XXV.) The Cretaceous shales were found exposed on the flanks of the mountain, about 400 feet above Dauphin Lake, and the rise from the level country at the foot of the mountain to that altitude is embraced within two and a half or three miles; yet within this narrow limit the drift on the slopes between each terrace, on the terraces themselves, or in the bottom of gullies excavated by mountain streams, gave no evidence of other rocks than those already named. It must be admitted that the time I could devote to an examination of the boulders was short, and a more minute search might give other results.

With this negative evidence in view, it appears probable that the Carboniferous Series is not represented in the only locality where it may be looked for with much chance of success. Nevertheless, between the Devonian and Cretaceous Series in the basin of Lake Winnipeg there is still a vertical section fully 400 feet in altitude, which is concealed by drift on the flanks of the Riding Mountain, covering a horizontal area two and a half to three miles broad. It is possible that within this narrow limit, or further to the north where the area may be much broader, rocks of Carboniferous, Permian, Triassic, or Jurassic age, may yet be found. With a view to show the relation which the Cretaceous and Carboniferous Series have to one another in lower latitudes, the following brief notice of their occurrence in Nebraska and Kansas is introduced.

In Nebraska the Carboniferous Series, or the coal measures, are exposed at the mouth of the Platte *, and extend up the river about fifty miles, when they dip beneath the water level of the Missouri. They are overlaid by No. 1 of the Nebraska section of the Cretaceous Series in lat. 41°·5, long. 96°. Cretaceous and Tertiary formations then occupy the valley of the Missouri as far as Fort Benton, lat. 47°·54, long. 110°, and extend into British America. Hence it appears that, ten degrees of latitude south of the Riding Mountain, the Cretaceous Series repose on the Carboniferous without the intervention of Permian, Triassic, or Jurassic rocks.

In Kansas territory, on the Kansas and Smoky Hill Rivers, an elaborate section has been made by Messrs. F. B. Meek and F. V. Hayden †, commencing with the Cretaceous sandstones on the summit of the Smoky Hills, lat. 38° 30′ N., long., 98° W., and descending through the various intermediate formations seen along the Smoky Hills and Kansas River to the mouth of the Big Blue River on the Kansas. This section, over 1000 feet vertically, passes from the Cretaceous to the upper coal measures, and includes rocks of Permian age. Messrs. Meek and Hayden remark, in relation to this section, "It will be observed we have in this general section, without attempting to draw lines between the systems or great primary divisions, presented in regular succession the various beds with the fossils found in each, from the Cretaceous sandstone on the summits of the Smoky Hills, down through several hundred feet of intermediate doubtful strata, so as to include the beds containing Permian

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* Notes explanatory of a Map and Section illustrating the Geological Structure of the Country bordering on the Missouri River, &c., by F. V. Hayden, M.D.

† Geological Explorations in Kansas Territory, by F. B. Meek and F. V. Hayden, published in the Proceedings of the Academy of Natural Sciences at Philadelphia.

types of fossils, and a considerable thickness of rocks, in which we find great numbers of upper coal measure forms. We have preferred to give the section in this form, because, in the first place, the upper coal measures of this region pass by such imperceptible gradations into the Permian above, that it is very difficult to determine, with our present information, at what particular horizon we should draw the line between them, while on the other hand it is equally difficult to define the limits between the Permian and beds above, in which we found no fossils." *

Jurassic or Triassic formations may occur above the Permian in the section just referred to. Messrs. Meek and Hayden state that "between No. 5 (of the Section) and the Cretaceous above, there is still a rather extensive series of beds in which we found no organic remains; these may be Jurassic or Triassic or both, though as we have elsewhere suggested, we rather incline to the opinion that they may prove to belong to the former."†

Formation No. 1 of the Nebraska Series of the Cretaceous rocks has not yet been recognized in Rupert's Land. This formation reposes on Jurassic rocks in Nebraska territory at the Black Hills.‡ It rests, as before stated, upon the limestones of the coal measures on the Missouri, near the 42nd parallel.

"There is at the base of the Cretaceous system, at distantly separated localities in Nebraska, Kansas, Arkansas, Texas, New Mexico, Alabama, and New Jersey, if not indeed everywhere in North America where that system is well developed, (at any rate east of the Rocky

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* Page 19, Geological Explorations in Kansas.

† Page 21, *ibid.*

‡ On the Lower Cretaceous Beds of Kansas and Nebraska, by F. B. Meek and F. V. Hayden.—Proceedings Acad. Nat. Sci. Phil., Dec. 1858, published in Am. Jour. Sci. page 219, 1859.

Mountains,) a series of various coloured clays and sandstones, and beds of sand, often of great thickness. In this series organic remains, excepting leaves of apparently dicotyledonous plants, fossil wood, and obscure casts of shells, are very rarely found, but it everywhere preserves a uniformity of lithological and other characters, pointing unmistakably to a similarity of physical conditions during their deposition, over immense areas.

"Although the weight of evidence thus far favours the conclusion that this lower series is of the age of the Lower Green Sand, or Neocomien, of the old world, we yet want *positive* evidence that portions of it may not be older than any part of the Cretaceous system."

Judging therefore, solely from the relation which the Cretaceous series bears to formations beneath them in their development through Rupert's Land, Nebraska, and Kansas, we might expect to find on the Riding Mountain in the vertical section concealed by drift, beneath formation No. 4, either formation No. 1, 2, and 3 of the Nebraska section, or members of the Jurassic and Permian as well as the Carboniferous series.

In the Report on the Geological Survey of the State of Iowa, published in 1858, the State geologist, James Hall, advances a highly important view of the relation of the Cretaceous formations to the Carboniferous Series. "Towards the Rocky Mountains, the palæozoic rocks are overlaid by the Cretaceous formation, which, in its lower arenaceous members, stretches from the northern limits of the United States territories to the Gulf of Mexico, and throughout a great part of this extent rests unconformably upon the coal measures.

"The line of junction of these two formations is obscured by the denudation of the higher one, and its finely comminuted materials are widely spread over the lower strata, forming with other materials the broad expanse of prairie deposit of the west." *

It is very gratifying to know that on the western side of the great basin between the Laurentides and the Rocky Mountains, and within the limit of the Saskatchewan valley, the Carboniferous series are represented. Sir Roderick I. Murchison, in his address at the Anniversary Meeting of the Royal Geographical Society, in referring to the splendid results of the Palliser Expedition, says, "Thus in addition to the determination of latitude, longitude, and the altitude of the mountains and two of their passes, Dr. Hector presents us with a sketch of the physical and geological structure of the chain, with its axis of slaty sub-crystalline rocks, overlaid by limestones of Devonian and Carboniferous age, and flanked on the eastern face by Carboniferous sandstone, representing, probably, our own coal fields, the whole followed by those Cretaceous and Tertiary deposits which constitute the subsoil of the vast and rich prairies watered by the North and South Saskatchewan, and their affluents." †

Ammonites.

FROM M^cKENZIE'S RIVER, PROBABLY FROM JURASSIC ROCKS.

[The two *Ammonites* from McKenzie's River, are not alone sufficient to determine the age of the rock from which they were obtained; the larger one bears considerable resemblance in form and general appearance to several Jurassic species though they may belong to the Cretaceous epoch. It is very desirable that a good series of specimens should be obtained from this remote northern locality, not only for the purpose of determining the age of the formation, but for the light they might throw upon far more interesting questions respecting the probable climatic conditions in these high northern latitudes during the secondary period.]

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* Remarks on the Tertiary and Cretaceous Formations of Nebraska, &c. &c., by F. B. Meek and F. V. Hayden, M.D.

† Page 318, Proceedings of the Royal Geological Society, vol. iii. No. 4.

After the above paragraph was published in my report on the expedition, page 182, Mr. Meek has written to me to say: "Since writing the paper on these fossils for your report, I have seen some figures of Jurassic species from the Aleutian Islands as high north as about the 58th parallel. Amongst these there is an Ammonite (*A. Wosnesseuski*, Grewingk.—Trans. Mineralogical Society of St. Petersburgh, 1848–9, Pl. IV.) resembling one of those I have described in your report (*A. Barnstoni*) so nearly in some of its characters, as to strengthen my suspicions that the rock from which these fossils were obtained on McKenzie's River may prove to be of Jurassic age. In the peculiar deep conical characters of the umbilicus of *A. Wosnesseuski*, it is very similar to *A. Barnstoni* but it is a more compressed shell, with straighter and more simple costæ; while its septa, if accurately drawn differ from those of *A. Barnstoni*, I am rather inclined to the opinion that these rocks on McKenzie's River will prove Jurassic, but we must wait for additional evidence before any positive opinion can be given."

The Rev. Samuel Haughton, F.R.S., discusses the question of climate in the Arctic regions in relation to the Liassic fossils found in *situ* on Prince Patrick Island and elsewhere north of the 75th parallel, in the geological account of the Arctic Archipelago, published in the Appendix to Captain McClintock's Narrative. Professor Haughton says, "But what are we to say as to the question of temperature? It was certainly necessary for an Ammonite to have a sea free from ice, on which to float and bask in the pale rays of the Arctic sun; and therefore I claim a temperature for those seas, at least similar to that which now prevails in the British Islands; and I may add that the Ammonite, from its habits, was essentially dependent on the temperature of the air as well as on that of the water."

"There is at present a difference of 49° 5′ between the mean annual temperature of Point Wilkie and Dublin; and if this change of temperature be supposed to be caused by a change of the relative positions of land and water, the temperature of Dublin, or of some place on the same parallel of latitude, must be supposed to be raised to 99° 5′, while the temperature of the thermal equator will exceed 124°,—a temperature only a few degrees below that requisite to boil an egg. I reject, without scruple, a theory that requires such a result, which must be considered as a minimum, as it is probable that the Ammonite required a finer climate than that of Britain for the full enjoyment of its existence.

"The theory of central heat, also, appears to me to be open to the same objection, as a mode of explaining this remarkable geological fact; for it will simply add a constant to our present climates, leaving the difference to remain, as at present, to be accounted for by latitude and distribution of land and water.

"The astronomical theory of Herschel, also, which would account for former changes of climate by changes in the radiating power of the sun, would only increase the temperature at each latitude, leaving the differences as at present.

"The only speculation with which I am acquainted which is capable of solving this *opprobrium geologicorum*, is the hypothesis of a change in the axis of rotation of the earth, the admission of which, as a geological possibility, is mathematically demonstrable, and which has recently had some singular evidence in its favour advanced by geologists. In 1851 I brought forward, at the Geological Society of Dublin, a case of augular fragments of granite, occurring in the carboniferous limestone of the county Dublin, and explained the phenomena by the supposition of the transporting power of ice. In 1855 Professor Ramsay laid before the Geological Society of London a full and detailed theory of glaciers and ice as agents concerned in the formation of a remarkable breccia, of Permian age, occurring in the central counties of England; and still more recently the same agent has been employed by the geological surveyors of India to account for the transport of materials at geological periods long antecedent to those in which ice transport is commonly supposed to have commenced. The motion of the earth's axis would reconcile all the facts known, and it must be regarded as a geological desideratum to determine its amount and direction, and to assign the cause of such a movement. The solution of this problem I regard as quite possible." *

This very interesting question has already been solved by the distinguished French mathematician, M. Leverrier. At p. 163 of tome ii. of the *Annales de l'Observatoire Impérial de Paris*, M. Leverrier gives 4° 51′ 42″ AS THE SUPERIOR LIMIT OF THE INCLINATION OF THE EARTH'S ORBIT UPON THE ECLIPTIC OF 1800, subject, however, to small corrections depending on any possible inaccuracies in the values of the planetary masses employed in his researches. Mr. J. R. Hind, Superintendent of the Nautical Almanac, to whom I am indebted for the subjoined table, states that the amount of correction cannot well exceed 8′, and probably is much less. The elements of the earth's orbit for periods of 10,000 years, reckoning backwards from A.D. 1800, are subjoined, from which it will be seen that the axis of rotation of the earth oscillates between certain small limits (4° 51′ 42″), not sufficient to account for the change in the climate of the Arctic regions which the presence of the fossils there appears to involve. Probably the influence of currents, similar to the Gulf stream of the present epoch, may have been instrumental in elevating the temperature of those regions, and producing a climate which would admit of the existence of Ammonites and plants, which can only flourish in a temperate zone.

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* Appendix to a Narrative of the Discovery of the Fate of Sir John Franklin and his Companions, by Captain McClintock, R.N., p. 395.

ELEMENTS OF THE EARTH'S ORBIT, ACCORDING TO M. LEVERRIER.

Years before 1800.	Excentricity.	Longitude of the Perihelion.	Inclination.	Longitude of the Node.
		° ′	° ′ ″	° ′
– 100,000	0·0473	316 18	3 45 31	96 34
– 90,000	0·0452	340 2	2 42 19	76 17
– 80,000	0·0398	4 13	1 18 58	73 47
– 70,000	0·0316	27 22	1 13 58	136 8
– 60,000	0·0218	46 8	2 36 42	136 29
– 50,000	0·0131	50 14	3 40 11	116 9
– 40,000	0·0109	28 36	4 3 1	91 59
– 30,000	0·0151	25 50	3 41 51	66 49
– 20,000	0·0188	44 0	2 44 12	41 34
– 10,000	0·0187	78 28	1 24 35	16 39
0	0·0168	99 30	0 0 0	0 0

⁂ The longitudes are referred to the Ecliptic and Equinox of 1800.

Mr. James Hall[*], the present State Geologist of Iowa, considers that the great development of the lower member of the Cretaceous formations in Western Iowa and the adjoining territories of Nebraska and Kansas, and its extension below the line where any well-marked Cretaceous species have been found, "suggests very strongly that we shall yet find lower geological formations, or those of the age of the Jura, or Oolite of Europe."*

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[*] Mr. James Hall, the author of that magnificent work, the Palæontology of the State of New York, &c. &c.

The discovery of Oolitic or Liassic rocks in Exmouth Island by Captain Belcher; of *Ammonites*, *Spirifer*, *Pecten*, &c. by Captain McClintock in Prince Patrick Island, lat. 76° 30′, long. 117° W. in localities corresponding to the northerly trend of the Carboniferous limestone of the Rocky Mountain region, and the great thickness of the rocks on an outlier of the Llana Estacado below any well marked Cretaceous fossils, indicate, Mr. Hall thinks, "the probable occurrence of lower fossiliferous rocks, or those of Jurassic age, along the whole length of the Rocky Mountains, and probably coextensive with the lower members of the Cretaceous Series."

Ammonites Barnstoni. (*N. S.*)

[Shell compressed, subglobose, broadly rounded on the dorsum, and prominent or subangular around the umbilicus which is deep, conical, and nearly as broad as the outer whorl. Volutions having their greater diameter at right angles to that of the shell; each of the inner ones about three-fourths hidden in the profound ventral groove of the succeeding turn. Surface ornamented by distinct regular costæ, which are sharply elevated around the umbilicus, into small elongated subnodose prominences; and at less than half the distance across the sides of the whorl, their number is increased nearly threefold by division and implantation; after which they become of uniform size, and arch gently forward in passing over the dorsum.

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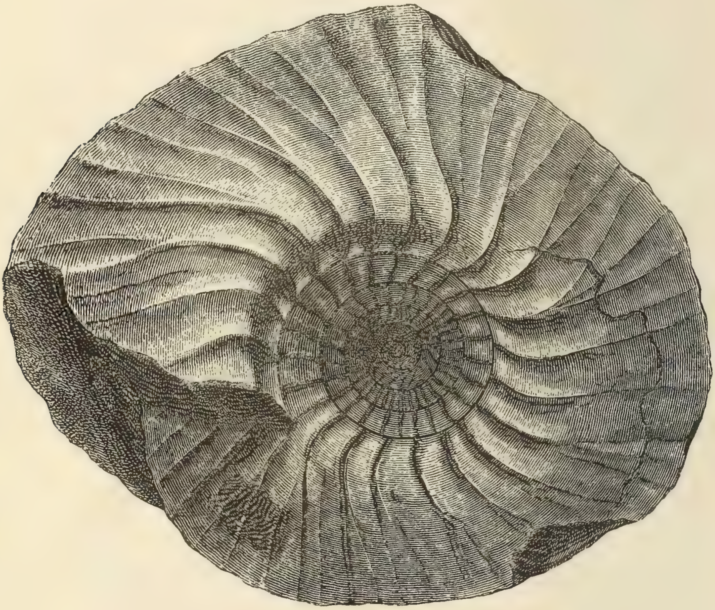
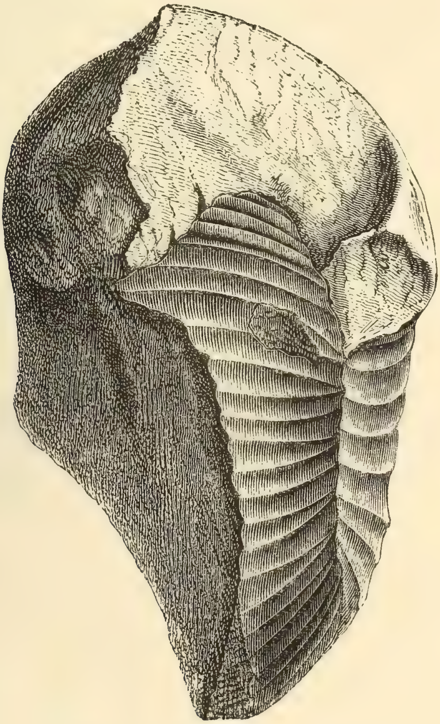
* Geological Survey of Iowa, page 144.

The septa are deeply divided into five principal lobes and six saddles, which are crowded together, and variously branched and subdivided. The dorsal lobe is a little longer than wide, and has three branches on each side, the two terminals of which are nearly straight and parallel; the first two lateral branches above these, are nearly of the same size, but more diverging; while the third pair are much smaller—and all sharply digitate, and more or less subdivided. The dorsal saddle is longer than wide, contracted in the middle, and irregularly divided into four unequal branches, the two terminals of which are subdivided into two branchlets each, and all obtusely digitate, and variously sinuous in the margins.



AMMONITE BARNSTONI. Side view, showing the deep umbilicus.

The superior lateral lobe is longer than the dorsal lobe, but very irregularly branched, and, like it, provided with numerous sharp digitations on all its divisions; at the extremity it has three very unequal branches, the middle one of which is much longer than the others, and very slender; the other two are small, unequal, opposite, and diverging;—that on the right being subdivided nearly to its base: above these there are several other unequal alternating lateral branches, one of which on the right side is much larger than the others. The lateral saddle is rather smaller than the dorsal, and divided at the extremity into two very unequal branches, of which the



Front view of the same specimen.

one on the left is larger than the other, and again deeply divided into two bifid and deeply sinuous branchlets. The inferior lateral lobe is much smaller than the superior, and very irregularly divided into two or three alternating unequal lateral branches on each side, and one terminal branch, with numerous sinuosities. The ventral lobe is very small, and simply digitate.

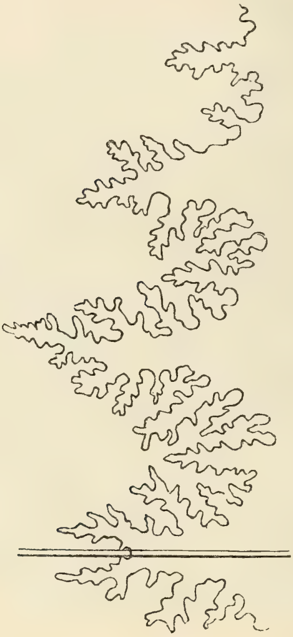


Diagram of one of the septa of AMMONITES BARNSTONI.

This species bears considerable resemblance in form, and in the size and character of its umbilicus, to the Jurassic species *A. irens*, D'Orbigny (Pal. Franc., tome i. p. 562, pl. 222), but differs in having the costæ pinched up into little subnodose prominences around the umbilicus, and bifurcating on the sides; they are also much more arched in passing over the dorsum. It is quite different from any of the described species from the Nebraska rocks, though I think I have seen some fragments of it in Lieut. Warren's collections from No. 4 of the Nebraska cretaceous subdivisions.

The specific name is given in honour of Mr. George Barnston, chief factor of the Hudson's Bay Company, who discovered it in the valley of Mackenzie's River. It is probably a Cretaceous species, but may be of Jurassic age.]

Ammonites Billingsi.

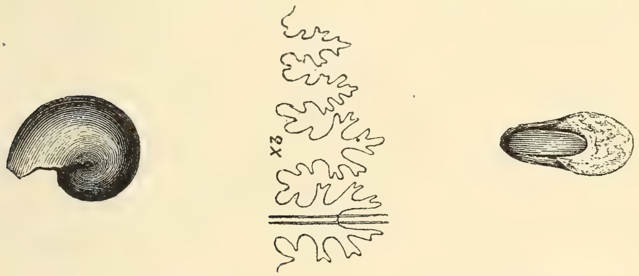


Fig. 1. Fig. 2. Fig. 3.

Fig. 1.—Side view. Fig. 2.—One of the septa enlarged.
Fig. 3.—Front view of same specimen.

[Shell moderately compressed, or subdiscoidal; dorsum rounded; umbilicus very small; volutions having their greater breadth at right angles to the shorter diameter of the shell, increasing rather rapidly in size, or more than doubling their diameter each turn; inner ones entirely embraced, and hidden in the ventral groove of the last turn: surface apparently smooth, but showing very faint traces of radiating costæ, which arch a little in crossing the dorsum.

Dorsal lobe longer than wide, provided with three branches on each side, the two terminal of which are much longer than the others, and each subdivided,—the subdivisions being short, and each having two or three small digitations; the first two lateral branches above these are small, opposite, very diverging, and bifid or digitate; and the third pair very small, and apparently simple. The dorsal saddle is as long as the dorsal lobe, but narrower, and has three or four short obtusely rounded branches on each side. The superior lateral lobe is nearly as large as the dorsal saddle, and has three subequal branches at the extremity,—that on the dorsal side being bifurcate, with digitate divisions; and the middle, and other lateral divisions, are provided with three or more small digitations each. The inferior lateral lobe is much smaller than the superior lateral, and has much the same form, excepting that its terminal division is proportionally larger, and the principal lateral division on the dorsal side is not so deeply divided. The ventral lobe is a little smaller, but in other respects very similar to the inferior lateral lobe; between it and the umbilicus there appears to be one or two smaller auxiliary ventral lobes, which seem to show a tendency to branch in the same way as the principal ventral lobe.

The specimen from which the foregoing description was made out, is evidently a young shell; consequently, adult individuals of the same species may be expected to possess much more distinct costæ. The lobes and saddles of the septa, in old shells, will also be found much more deeply divided and more complex, but the mode of branching probably remains the same from the time the principal divisions are formed.

As the specimen described was found in the matrix filling the umbilicus of *A. Barnstoni* (being only 0·67 inch in its greatest diameter), it might be supposed by those who know how widely the *Ammonites* sometimes vary at different ages, that it may be the young of that species. It presents fundamental differences, however, in the mode of branching of the lobes and saddles of its septa, that cannot be due to different stages of development. In addition to this, I found along with it a much smaller specimen, evidently the young of *A. Barnstoni*, which shows that the young of that species did not vary in form materially from the adult, and is quite different from the species now under consideration.

It has much the form of *A. Halli*, Meek and Hayden (Proceed. Acad. Nat. Sci. Phil., vol. viii. p. 70), and there are no differences in the structure of the dorsal lobes of the two, that might not be due to different degrees of development. Their superior lateral lobes and dorsal saddles, however, present radical differences, such as we never see in the same species, however widely they may differ in size or age.

I have named this species in honour of Mr. E. Billings, the accomplished Palæontologist of the Canadian Geological Survey.]

CHAP. XL.

THE CRETACEOUS SERIES.—TERTIARY FORMATIONS.

Distribution of the Cretaceous Series in Western North America.—The Nebraska Section.—Vertical Section in Nebraska and Rupert's Land.—Formation No. 1.—Formation No. 2.—Formation No. 3.—Formation No. 4.—Great Development of Formation No. 4 in Rupert's Land.—Fossils.—Steatitic Minerals.—Analysis of.—Anomia Flemingi.—Inosceramus Canadensis.—Leda Hindi.—Scaphites Nodosus.—Clay Iron-stone.—Bands of this Formation.—Distribution of.—Richness of.—Analysis of.—Formation No. 5 of the Nebraska Section.—Its Occurrence on the Flanks of Rocky Mountains.—Fossils of.—Avicula Linguæformis.—Avicula Nebrascana.—Nautilus Dekayi.——Tertiary Formations.—Lignite on the Riding and Duck Mountains.—Sand Dunes probably derived from Tertiary Rocks.—Tertiary Coal.—Lignite Basin of the Missouri.—Lignite on the North Saskatchewan.—On Red Deer River.—On the South Branch.—Lignites of Oregon and British Columbia.

The Cretaceous Series are more extensively distributed in Rupert's Land, than any other fossiliferous formations. This remark, indeed, is susceptible of extension to the continent of North America, where the extraordinary development of this series may be inferred from the fact, that they have been traced continuously from beyond the North Branch of the Saskatchewan to the Gulf of Mexico, and under the 52nd parallel, nearly across the fossiliferous basin, or over 12° of longitude. Its eastern boundary in Rupert's Land is shown approximately by the Pembina Mountain, and the continuation of that ancient sea coast, to the main Saskatchewan below

Fort à la Corne, thence north-westerly. Cretaceous rocks were recognized by Dr. Hector * at the Snake Portage, in lat. 54° long. 111° 30′; also on Little Red Deer River, at the base of the Rocky Mountains, in long. 114°.

This important series, as it occurs in Nebraska, has been carefully studied by Messrs. Meek and Hayden. In the notes explanatory of a map and section illustrating the geological structure of the country bordering on the Missouri River, Dr. Hayden has described the rocks of Nebraska Territory †, where the Cretaceous Series is best developed; and as this division, styled the NEBRASKA SECTION, forms the standard to which the Cretaceous rocks of the north-west are referred on the American Continent, the following division of the series in Rupert's Land is based upon the Nebraska Section.

The vertical section of the geological formations of Nebraska Territory, with their extension into Rupert's Land, as far as determined, is given on pp. 320, 321.

FORMATION NO. 1, OF VERTICAL SECTION.

The following excellent descriptions, enclosed in brackets, of the formations constituting the Nebraska Section, are from the clear and concise "Notes Explanatory of a Map," &c., by F. B. Meek and F. V. Hayden, M.D. They are introduced here for the purpose of comparison with the development of the same formations in Rupert's Land.

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* Papers relative to the Exploration of British North America. Blue Book, 1859.

† Notes explanatory of a Map and Section illustrating the Geological Structure of the Country on the Missouri River from the Mouth of the Platte River to Fort Benton, in lat. 47° 30′ N., long. 110° 30′ W., by F. V. Hayden, M.D. Proc. Acad. Nat. Sci. Phil., May, 1857.

VERTICAL SECTION OF THE GEOLOGICAL FORMATIONS OF NEBRASKA TERRITORY, AS FAR AS DETERMINED, WITH THEIR EXTENSION INTO RUPERT'S LAND.

Subdivisions.			Localities.	Estimated thickness.	Localites in Rupert's Land.
TERTIARY SYSTEM.	MIOCENE.	Light-coloured indurated clays, with occasional beds of sandstone, conglomerate and whitish limestone. Great numbers of *mammalian* and *chelonian* remains with a few fresh-water and land shells.—(Bad Lands of White River.) Beds of clay, sand, sandstone, and lignite, containing great numbers of fresh-water and land *mollusca*, with a few marine or estuary shells; remains of plants, *Saurians*, *Trionyx*, &c.—(Great Lignite Basin.) Sand, sandstone, clays, and very impure lignite, with remains of fresh-water, land, and a few estuary shells, *Saurians*, fishes, *Trionyx*, &c.—(Bad Lands of Judith.)	*Mauvaises Terres* of White River. Great extent of country on both sides of the Missouri between Heart and Milk Rivers; on the Yellow Stone. Bad Land at the mouth of Judith River, &c.	About 900? feet.	Grand Coteau de Missouri.
CRETACEOUS SYSTEM.	No. 5.	Grey and yellowish arenaceous, clays, and sandstones, sometimes weathering to pink colour; containing *Belemnitella bulbosa*, *Nautilus Dekayi*, *Ammonites placenta*, *A. lobatus*, *Scaphites Conradi*, *Baculites ovatus*, and great numbers of other marine mollusca.	Moreau trading post, and under the Tertiary of Sage and Bear Creeks. Fox Hills.	100 to 150 feet.	Yellowish grey concretionary sandstone, underlaid by greenish grey concretionary sandstone. Concretions contain *Avicula Nebrascana* and weather reddish-brown. Selenite in veins, fibrous lignite, impressions of leaves.—Calcareous band on the Qu'appelle at the height of land composed of *Avicula linguæformis*.—South Branch of the Saskatchewan, *Scaphites Conradi*, *Nautilus Dekayi*, *Avicula linguæformis*, *Avicula Nebrascana*.
	No. 4.	Bluish and dark grey plastic clays, containing *Nautilus Dekayi*, *Ammonites placenta*, *Baculites ovatus*, and *B. compressus*, with numerous other marine mollusca,—remains of *Mosasaurus*.	Great area about Fort Pierre and along the Missouri below there. Under No. 5, at Sage and Bear Creeks. Great Bend of the Missouri. Near Milk and Mussel Shell Rivers.	350 feet.	Lead grey and purple argillaceous shales, characterized by vast numbers of nodules of clay iron-stone.—Little Souris River, containing *Anomia Flemingi*, *Inoceramus Canadensis*, *Leda Hindi*.—Two Creeks, Assinniboine River, *Natica obliquata*, *Avellana concinna; Ammonites*.—South Branch of the Saskatchewan, *Leda Evansi*, *Ammonites placenta*, *Scaphites nodosus*.

CRETACEOUS SYSTEM.	No. 3.	20 feet.	Dark, very fine unctuous clay, containing much carbonaceous matter, with veins and seams of selenite, sulphuret of iron, fish and scales (local).	Bluffs along the Missouri below the Great Bend. Extends to Big Sioux River, and occurs along the latter stream.	150 feet. Wanting in New Jersey and Alabama.	North Branch of the Saskatchewan at the Coal Falls (?) Sharks' teeth, scales of fish, *Inoceramus*.
		100 feet.	Lead grey calcareous marl, weathering above to a yellowish tint. Scales and other remains of fishes—*Ostrea congesta*—passing downwards into			
		30 feet.	Light grey or yellowish limestone, containing great numbers of *Inoceramus problematicus*, fish scales and *Ostrea congesta*.			
	No. 2.		Dark grey laminated clay; scales and other remains of fishes, small Ammonites, *Inoceramus problematicus*? *Serpula*, small oyster-like *O. congesta*, &c.	Along the Missouri Bluffs, from 10 miles above James River to Big Sioux River.	90 feet. Wanting in New Jersey and Alabama.	Assinniboine, scales of fish. North Branch of the Saskatchewan at the Coal Falls (?)
	No. 1.		Yellowish and reddish friable sandstone, with alternations of dark and whitish clays. Seams and beds of impure lignite, fossil wood, impressions of dicotyledonous leaves; *Solen*, *Pectunculus*, *Cyprina*, &c. This bed is not positively known to belong to the Cretaceous System.	Near the mouth of Big Sioux River, and between there and Council Bluffs. Near Judith River.	90 to 100 feet, or more.	Not recognized in area explored.
CARBONIFEROUS SYSTEM.			Yellow limestone, containing *Fusulina cylindrica*, *Terebratula subtilita*, *Spirifer Meusebachanus*, *Allorisma regularis*, and other fossils of the coal measures.	Forms shoals in the Missouri River at De Soto; 15 to 20 feet exposed at Council Bluffs, at low stages of the river.	Unknown.	Not recognized in area explored.

[In the order of superposition, formation No. 1 rests directly upon the true limestones of the coal measures. Its first exposure seen along the Missouri is at Wood's Bluffs, right bank, about eighty miles above the mouth of the Platte, and it dips beneath the water level of the Missouri, a few miles below the mouth of the Vermilion. Its general character is a coarse grained, friable sandstone, very ferruginous, of a yellow or reddish-yellow colour, with thin beds of impure lignite and various coloured clays. It contains very few fossils, mostly of the genera *Solen*, *Cyprina* and *Pectunculus*, also fossil wood, and numerous impressions of dicotyledonous leaves, similar to the common willow. Its entire thickness is estimated at ninety to one hundred feet, but it may be more.]

This formation has not yet been recognized in Rupert's Land. In Nebraska it reposes upon the upper members of the Carboniferous Series near the mouth of the Platte (lat. 41° 40′), and it overlies Jurassic rocks at the Black Hills.*

FORMATION NO. 2 OF VERTICAL SECTION.

[This formation is first revealed in thin outliers below the mouth of Big Sioux River, and on that stream six miles above its mouth, it caps the bluffs, apparently mingling to some extent with the succeeding bed, and containing at this locality large numbers of *Inoceramus problematicus* and fragments of fishes. Near the mouth of Iowa Creek and above, it shows itself worthy of a separate position in the series. It is composed of a dark leaden grey, laminated, plastic clay, containing few fossils, but great quantities of the sulphate of lime in crystals, assuming a variety of beautiful forms. Its greatest thickness is seen five miles below the mouth of James River. At Dorion's Hills it is seen at low water mark. Entire thickness estimated at ninety feet. Fossils, *Ammonites*, *Inoceramus*, *Cytheria*, *Serpula*, *Ostrea*, and abundant fish remains.]

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* Descriptions of the Species and Genera of Fossils collected by Dr. F. V. Hayden in Nebraska Territory, under the direction of Lieut. C. K. Warren, U.S. Topographical Engineer, with some Remarks on the Tertiary and Cretaceous Formations of Nebraska, and the parallelism of the latter with those of other portions of the United States and Territories, by F. B. M., and F. V. Hayden, M.D.

This formation has been recognized on the Assinniboine.

On the North Branch of the Saskatchewan, a few miles above the Grand Forks, huge masses of a dark coloured, almost black shale, with sharp, well-preserved edges jut out of the banks and are exposed whenever portions of the face of the clay cliffs fall into the river. Their appearance is such as to justify the expectation that rock in position from which they originated is close at hand. Some specimens which I procured and sent to Mr. Meek, contain, according to that gentleman, fish scales, sharks' teeth and *Inoceramus*, which renders it almost certain that the masses were detached from rocks belonging to Formation 2 or 3, of the vertical section. I have therefore assigned in the foregoing table, the locality Coal Falls, North Branch of the Saskatchewan, with a note of interrogation, as the probable outcrop of one or both of these divisions of the vertical section.

FORMATION NO. 3 OF VERTICAL SECTION.

[The geographical distribution of this formation and its influence on the scenery render it one of the most interesting on the Missouri. It is first seen in thin outliers near the mouth of Big Sioux River, and becomes quite conspicuous on the summits of the bluffs, ten miles above the Iowa Creek. At Dorion's Hills, it reaches to the water's edge, and is the prevailing formation from thence to the foot of the Great Bend, where it passes by a gentle dip beneath the water level of the Missouri. At Dorion's Hills there is a fine section of this bed about eighty feet exposed above the water's edge, containing its most abundant and characteristic fossil, *Ostrea congesta.* In many places, as opposite the mouth of Running Water, it assumes the form of a long series of precipitous bluffs, giving a pleasing variety to the general monotony of the scenery. This is one of the principal characteristic external features of this formation.

The upper portion of this rock is a yellowish and grey calcareous marl, very soft and yielding, so that it is easily cut up into numerous ravines by the temporary streams, and thus the bluffs along this part of the Missouri often present the appearance of a series of cones. The lower stratum, however, is more compact, and forms a soft bluish grey limestone.

Though so well developed and covering so wide an area, the middle and upper portions, at least, of this rock can never be made useful for building purposes. Quite soft and friable in places, when detached, it absorbs moisture rapidly and crumbles in pieces. Being a rich calcareous marl, it may be used at some future time as a fertilizer.

The fossils of this formation, though belonging to few species, as far as is yet known, are numerous in individuals. A species of oyster (*Ostrea congesta*) is found in great quantities throughout the bed, and in localities *Inoceramus problematicus* is abundant. Fish remains, though consisting mostly of scales and obscure fragments, are disseminated throughout the deposit, several species of which have already been identified and described by Dr. Leidy. Entire thickness of this bed about 150 feet.

Near First Cedar Island, a very singular bed makes its appearance, superimposed on No. 3, which we shall consider as probably forming a local upper member of that formation. It extends up the Missouri River to a point near the Great Bend, a distance of about eighty miles. Lithologically it is a dull black, unctuous clay, destitute of any grit, and does not effervesce with an acid. It contains some carbonaceous matter and great quantities of selenite in crystals.]

This formation, as stated above, probably occurs on the North Branch of the Saskatchewan, at the Coal Falls.

FORMATION NO. 4 OF VERTICAL SECTION.

[This formation is the most important one in the Cretaceous system of the north-west, not only in regard to its thickness and its geographical distribution, but also in its influence on the agricultural capabilities of the country. It is only second in interest to the succeeding bed in the number, beauty, and variety of its organic remains. Commencing about ten miles above the mouth of James River, where it is seen only in thin outliers capping the distant hills or bluffs, it continues gradually assuming a greater thickness as we ascend the Missouri until reaching the Great Bend, where it monopolizes the whole region, giving to the country underlaid by it a most gloomy and sterile aspect. At the Great Bend it attains a thickness of 200 feet, and continues to occupy the country bordering on the Missouri to the mouth of Grand River, where, in consequence of the dip of the strata, it passes gradually beneath the level of the river.

After dipping beneath the water level between Grand and Cannon Ball Rivers, this formation again rises to the surface about thirty miles below the mouth of Milk River (far up towards the sources of the Missouri), by a reversed dip of the strata, from beneath the northern portion of the Great Lignite Basin, as will be seen by reference to the section on the map. Near the mouth of the Mussel Shell River it occupies the whole country for a distance of about eighty miles, and thins out upon the tops of the hills near the mouth of the Judith River.

In summing up the extent of country underlaid by this great formation, we find that south of the Lignite Basin, it occupies an area of 200 miles in length and 100 in breadth, or 20,000 square miles. North of the Great Lignite Basin, commencing at its first appearance near Milk River, we find it covering an area of 200 miles in length and 60 in breadth, or about 12,000 square miles. I have been thus particular in estimating its approximate limits and extent of surface on account of its influence on the future destiny of that region. Wherever this deposit prevails, it renders the country more completely sterile than any other geological formation I have seen in the north-west. We see from the above estimate that it renders barren over 30,000 square miles of the valley of the Missouri.

The fossils of this formation are too numerous to mention in detail. The upper and lower members appear to be exceedingly fossiliferous, while the intervening portions of considerable thickness contain only a few imperfect specimens of *Cephalopoda* and the bones of *Mosasaurus Missouriensis.* The entire thickness of this formation may be estimated at about 350 feet.]

The formation is probably more extensively developed in Rupert's Land than any other member of the Cretaceous Series.

The most easterly exposure, where it holds characteristic fossils, is on the Little Souris. Fifteen miles from the mouth of that river it consists of a very fissile, dark-blue argillaceous shale, holding numerous concretions containing a large percentage of iron. Some very obscure fossils were found in it, with fragments of *Inoceramus Canadensis*.* The shale weathers ash-white; and the exposure on the Little Souris is seventy feet thick in horizontal layers.

Where the river has excavated a passage through the Blue Hills of the Souris, the rock frequently occurs in cliffs, the dip being 3° south. Fragments and perfect forms, but very fragile, of *Inoceramus Canadensis*, are very common. The ferruginous concretions are disposed in regular layers, and constitute a marked feature of the rocks of this valley.

A few miles west of the Blue Hills the dip of a very remarkable exposure of shale, with bands of ferruginous concretions, facing the south, was leveled with the utmost care, and found to be perfectly horizontal. At the base of the exposure, and on a level with the water's edge, a layer occurs full of gigantic *Inoceramus*, probably the same species as those before-mentioned. One specimen measured eight inches and a half in diameter, it was very fragile; but the peculiar prismatic structure of the shell was remarkably well preserved. On attempting to raise it, it separated into thousands of minute prisms.

A search for fossils here was more successful, and resulted in the discovery of several new species, which were examined, named, and described by Mr. Meek of Washington.

On the Two Creeks, an affluent of the Assinniboine, the same formation exists. Among the fossils collected there were *Natica obliquata*, *Avellana concinna*, *Ammonites* (sp. undt.), &c. &c.

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* See figure on p. 336.

At the second, or most westerly of the Two Creeks the shales are exposed, and the following section occurs:—

Twenty feet of drift, containing fragments of the underlying shales and water-worn boulders of gneiss, &c.

Six feet of ash-grey shales, containing a stratum five inches thick of a pale-green unctuous steatitic substance.

The steatitic stratum has the following composition*:—

SiO_3	50·83
Al_2O_3	14·45
CaO	1·23
MgO	2·33
FeO	6·35
KO	0·42
HO	24·36
	99·97

On the Qu'appelle River this rock is again seen below the Big Cut-arm Creek, and near the Scissors Creek, also at White Sand River near Fort Pelly, and on Birdstail Creek east of the Assinniboine. Although no distinctive organic forms were procured, yet the lithological aspect of the rock is the same as on the Little Souris. This remark applies also to the outcrop on the Riding Mountain.

An exposure, a few miles below the mouth of the "River that Turns" on the South Branch of the Saskatchewan, contains at its base a hard calcareous sandstone, containing *Avicula linguæformis;* below it is a soft sandstone destitute of fossils. It is not improbable that the strata above the second concretionary layer pass into Formation 5 of the Nebraska section, and represent the upper Cretaceous series in this region.

Formation No. 4, as developed on the Little Souris

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* This analysis was kindly furnished me by H. H. Croft, D.C.L., Professor of Chemistry in University College, Toronto.

River, is distinguished by nodular masses of clay iron-stone of great richness and in extraordinary profusion.

The locality where the clay iron-stone was first remarked occurs fifteen miles from the point where the Little Souris debouches into the Assinniboine. Here the rock consists of a dark-blue argillaceous shale with clay iron-stone layers. The nodular masses vary from eighteen inches to three inches in diameter. They are generally of a compressed elliptical form, and vary from two to nineteen inches in thickness. They form horizontal tiers in the rock, and are often separated by steel-grey and light ash-grey argillaceous bands, which also contain thin seams of clay iron-stone of irregular thickness, and not continuous for many yards.

Where the river has excavated a passage through the Blue Hills of the Souris, the nodules of clay iron-stone are seen disposed in regular layers, jutting out of the cliff and presenting different colours, varying from steel-grey to reddish-brown and light buff-brown, according to the length of time they have been exposed to the action of the atmosphere and the freedom of the ore from mechanical admixtures, such as clay, lime, and magnesia.

A few miles west of the Blue Hills of the Souris, near Plum Creek, the nodular masses of clay iron-stone were everywhere distributed in the river and on the beach. They formed, in fact, the chief constituents of the bottom of the river, and it may be said to flow in this locality over coarse clay iron-stone gravel. The section at the spot referred to, was seventy feet thick, exposed in the form of a nearly perpendicular cliff. The whole of the layers were either tinged with peroxide of iron or of a purple hue, according to the degree of humidity to which they had been exposed by drainage from the prairie or springs.

Where the clay iron-stone bands were first observed the river was flowing in a S.W. by S. direction; this course it maintained for about thirteen miles, and then suddenly turning at right angles, the valley pursues a N.W. by W. course for twenty-six miles, it then turns to the S.W. again. For thirteen miles along the south-westerly course, and twenty-three miles along the north-westerly, course the iron-stone bands were seen whenever the river was approached, and throughout the greater portion of the distance the opposite bank and the rocks composing it were clearly visible, always preserving the same aspect, and showing numerous clay iron-stone bands. Hence we may infer that over this part of the country drained by the Souris, the clay iron-stone is an integral and important part of Formation No. 4, occurring in the form of a series of bands of nodules or as thin sheets of the ore, sometimes possessing thickness sufficient to give them great economic value, at other times thinning out altogether.

On the flanks of the Riding Mountain, about ninety miles N. from the great bend of the Little Souris, Formation No. 4 was recognized, and although in the valley of Ochre River nodular masses of clay iron-stone were seen, yet the layers were not observed forming a prominent feature in the exposure on the flanks of the precipitous and elevated N.E. escarpment of the Riding Mountain. But no search was made for them during the ascent, and snow covered the ground when we returned. From the circumstance that the nodular masses of ore were seen in the bed of Ochre River, it is not improbable that the iron bearing layers extend as far N. as the Riding Mountain. Associated with the clay iron-stone beds on the Souris is a very persistent band of the steatitic mineral already noticed (p. 328), pale greenish-yellow in colour, very unctuous and soft, and easily moulded into forms by the hand. One bank on the Little Souris is four inches thick. Others above and below it vary from half an inch, and of irregular thickness, to three inches. The soap-stone bands were noticed on a small tributary of the Little Saskatchewan, itself an affluent of the Assinniboine, where Formation No. 4 crops out half way between the great bend of the Souris and the Riding Mountain.

It is not improbable that the clay iron-stone bands extend without interruption from the Little Souris to the Riding Mountain. They would be deeply covered with drift or the superior formations between the summit of the Riding Mountain and the Assinniboine, hence, as sources of iron-ore, not available under the present circumstances of the country.

On the Little Souris the drift is very shallow, sometimes composed almost altogether of the ruins of the formation itself, hence, over wide areas in its valley the ore is easily accessible, and many thousand tons of nodules could be picked from the exposed rock or from the bed of the river, to be annually renewed by the wearing away of the surface of the cliffs. A very rapid survey showed that this annual renewal might be expected to take place, to a certain extent, for a distance of thirty-six miles on each side of the river, over an exposed surface of seventy-two miles in all, without reckoning the vast accumulations which must occupy the bends of the river where spits or beaches are formed.

It has been stated at the beginning of this chapter that the Cretaceous rocks extend from the North Branch of the Saskatchewan to the frontier of Mexico, in part flanking the Rocky Mountains. In Nebraska and Kansas their physical and geological characteristics have been more or less studied, and it would be interesting to know whether the clay iron-stone forms there a constituent of Formation No. 4.

Mr. Meek informs me that clay iron-stone concretions occur at many places in the fourth division of the Cretaceous rock in Nebraska, but he has no knowledge of its occurrence there in quantities sufficient to be considered of much value.

The Quartzose sand, highly ferruginous throughout New Jersey, is one of the representatives of Formations 4 and 5 of the Nebraska Section, probably of No. 4.

The richness of the clay iron-stones of the Little Souris may be inferred from the following comparison:—

The principal ore from which iron is smelted in England and Scotland is the carbonate of iron of the coal measures. It occurs chiefly in the form of nodular masses associated with the strata of coal. This ore yields from 30 to 40 per cent. iron of good quality.

The iron-ore of the Little Souris varies in quality, many nodular masses appearing to consist nearly altogether of carbonate of iron, and possess a semi-crystalline arrangement like the sparry iron of the unfossiliferous rocks. An approximate analysis of several specimens gave 75 to 85 per cent. of proto-carbonate of iron, which would answer to 34 per cent. and 41 per cent. of pure iron respectively.

I am indebted to Professor Croft for an exact analysis of a fragment of a nodule which he took, without making any particular selection, from my specimens.

He found 82·720 per cent. of proto-carbonate of iron, which is equal to 39·930 per cent. of iron, or very nearly 40 per cent.

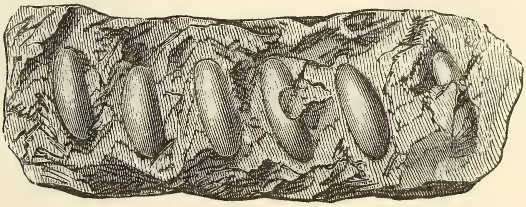
The richest specimen selected by Dr. Colquhoun, from the sparry iron-ores of the Glasgow coal-field, gave 41·25 per cent. of pure iron. This differs by 1·320 per cent. from the specimen analyzed by Professor Croft, and I am convinced that a little care in selection would establish the fact that the iron-ores of the Souris would take a very high rank in point of richness in metal among the most celebrated English and Scotch clay iron-stone ores.

Subjoined is Professor Croft's analysis: —

Clay iron-stone from the Little Souris.

FeO, CO_2	82·720
CaO, CO_2	6·705
MgO, CO_2	trace
Insoluble residue	8·181
Phosphoric acid and loss	2·394
	100·000

The following specimens are from Formation No. 4 of the vertical section in Rupert's Land.

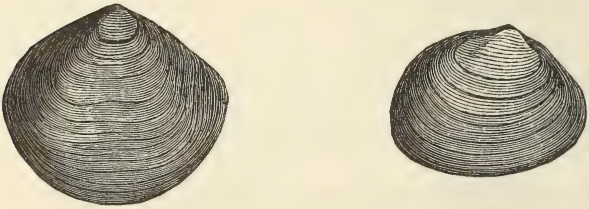


Curious Spiral Fossil from the Two Creeks.

[Several impressions, apparently of the stems of marine plants, occur in the specimens from the locality on the Assinniboine, near the mouth of the Two Creeks.

Along with the above there are also specimens of a very curious spiral body, differing from any fossil I ever before met with. It is a long, slender, slightly flattened, or sub-cylindrical body, measuring in every part of its length about 0·18 inch in its greatest diameter, and very regularly coiled into a spiral form, the turns being widely disconnected, like those of a cork-screw. Each turn measures about 0·58 inch across, and there are five turns in a length of 2·15 inches. It is smooth, and shows no organic structure under a common pocket lens, the organic matter having been replaced by the fine sediment of which the matrix is composed. Unless these are the tendrils or root-like appendages by which some floating plant clung to marine bodies, I can form no conjecture in regard to their nature. (See p. 333.)]

Anomia Flemingi. (*N. S.*)



Two different specimens of this species. The fine concentric lines representing shading.

[Shell oval or sub-circular, compressed plano-convex, extremely thin and fragile. Lower valve flat and apparently more nearly circular than the other. Upper valve depressed, convex, rounded in front, and more broadly and less regularly rounded on the ventral side; posterior margin obliquely subtruncate from the dorsal side, rather abruptly rounded, and waved so as to form a broad very obscure fold at its connexion with the ventral margin; beak small, compressed, located near the middle of the cardinal edge, but not projecting beyond it. Surface marked by small obscure lines of growth. Length 1·10 inches; breadth from beak to opposite side, 1 inch.

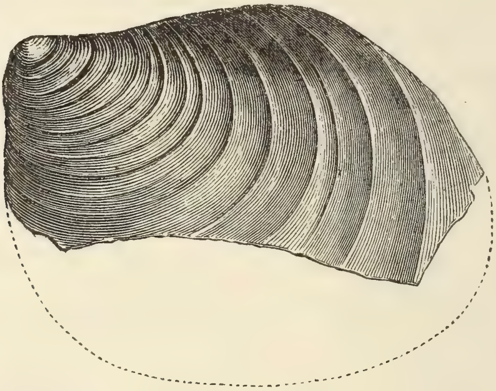
In Formation No. 4 of the Cretaceous beds in Nebraska there is a species something like this, which Dr. Hayden and I have described (but not yet published) under the name of *A. subtrigonalis.* The species now before me, however, is much more compressed, and more rounded in outline. It differs from *A. tellinoides* of Morton (Synop. Org. Rem., p. 61, pl. v. fig. 11), in being straighter on the cardinal side, and in having the umbo of the upper valve much less prominent and gibbous. Named after Mr. John Fleming, one of the gentlemen connected with the Saskatchewan expedition.

Locality and position.—Little Souris River, in soft lead-grey argillaceous rock, or indurated clay, probably of the age of the fourth division of the Cretaceous Series in Nebraska.]

Inoceramus Canadensis. (*N. S.*)

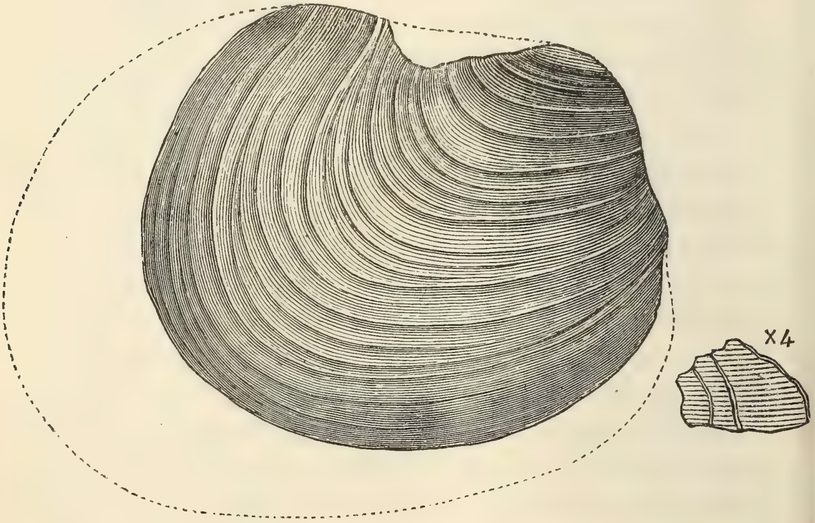
[Shell broad, oblong-oval, compressed, apparently very nearly equi-valve ; anterior side rounded ; posterior side longer and more broadly rounded or sub-truncate ; base forming a semi-oval curve ; hinge straight, of medium length ; beaks small, compressed, scarcely rising above the hinge line, located near the anterior side, not very oblique ; surface ornamented by small, obscure, irregular concentric undulations, and fine closely arranged rather indistinct lines of growth, which are generally only seen on the outer fibrous layer. Length of largest specimen about 3·35 inches ; height near 2·80 inches.

The specimens of this species in the collection are imperfect, but retain enough of its characters to show it is distinct from any of the known species in the Nebraska formations. It resembles somewhat *I. Sagensis*, Owen, (Report, Wisconsin, Iowa, and Minnesota, tab. vii. fig. 3,) but is much more compressed, and longer in proportion to its height.



Inoceramus Canadensis.—Left valve.

It also bears some resemblance to *I. regularis*, D'Orbigny,

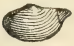


Right valve. The finer concentric lines represent shading. The small figure × 4 shows the fine striæ seen on the outer fibrous layer of the shell, magnified four times.

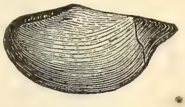
(Pal. France, T. III. pl. 410,) but is not near so deeply rounded on the ventral border, and is more compressed.

Locality and position.—Same as last.]

Leda Hindi. (*N. S.*)



Natural size.



The same enlarged.

[Shell small, sub-ovate, compressed; anterior side narrowly rounded; pallial border forming a broad semi-oval or semi-ovate curve, not crenulate within; posterior side a little longer than the other, much compressed, distinctly sinuous below, and provided with a narrow, short, obtusely pointed rostriform extension above; umbones depressed, located a little in advance of the middle; hinge having about twelve teeth in front of the beaks, and probably more behind; surface ornamented by distinct, regularly arranged, rather strong concentric lines. Length 0·35 inch; height 0·18 inch.

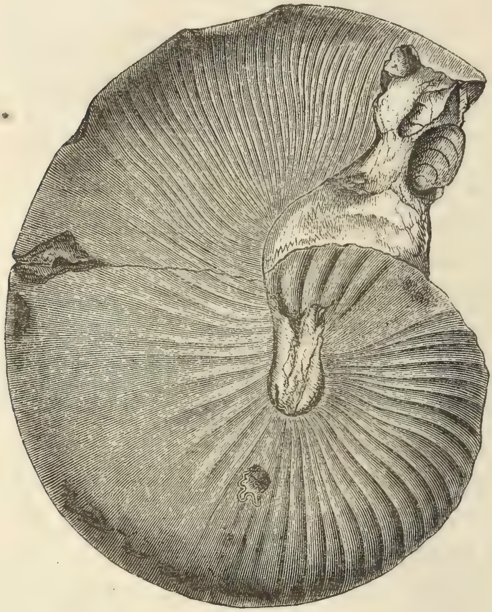
This is a very neat little shell, which will be readily distinguished from any of the species yet known in the Nebraska Cretaceous rocks by the distinct sinus in its postero-ventral margin. Even where the border is broken away, the curve of the concentric lines will always show that the sinus did exist in its margin.

The specimen does not show the pallial line, but in form and general appearance the shell is more like *Leda* than *Nucula;* it may, however, possibly belong to the latter genus.

The specific name is given in honour of Professor Henry Y. Hind, of Trinity College, Toronto, in charge of the Assinniboine and Saskatchewan Exploring Expedition, to whose zeal and industry we are indebted for much interesting information respecting the geology and topography of the country explored.

Locality and position. — Little Souris River, from an equivalent to No. 4 of the Nebraska section.]

Scaphites Nodosus [?] *Var.*



Scaphites Nodosus.—Side view.

[*Scaphites nodosus* [?] — Owen, 1852. Rept. Iowa, Wisconsin, and Minnesota.

Locality. — South Branch of the Saskatchewan, from an equivalent of Formation No. 4 of Nebraska Section.]

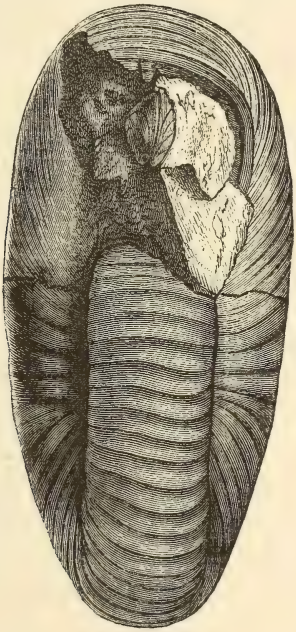
Ammonites.—Sp. undt. (fragments).

[*Locality and position.*—Two Creeks, Eq. No. 4 of the Nebraska Cretaceous series.]

Natica Obliquata.

[*Natica obliquata.*—Hall and Meek, Mem. Acad. Arts and Sci., Boston, vol. v. n. s. p. 384, pl. iii. fig. 1.

Locality and position.—Two Creeks, on the Assinniboine; in bed representing Formation No. 4 of the Nebraska Cretaceous series.]



Front view of Scaphites Nodosus. The fine lines represent shading.

The specimen figured shows the remains of two rows of tubercles on the dorsum —one on each side. They are much worn, and have been unfortunately omitted altogether by the artist.

Avellana Concinna.

[*Actæon concinna.*—Hall and Meek, Mem. Am. Acad. Arts and Sci., Boston, vol. v. N. S. p. 388, pl. ii. fig. 6.

The specimen of this species, first figured in the paper above cited, is either a young individual, or the outer lip was broken away; for that now before me, which is evidently the same species, has a strong thickened outer lip; consequently, it cannot be a true *Actæon*, but agrees more nearly with the characters of the genus *Avellana.*

Locality and position.—Same as last.]

Ammonites Placenta.

[*Ammonites placenta.*—Dekay, N. Y. Lyc. Nat. Hist., vol. ii. pl. v, fig. 2; Journ. Acad. Nat. Sci., Phila., vol. vi. p. 88, &c.; Morton, Synop. Org. Rem., p. 36, pl. ii. figs. 1 and 2.

Locality and position.—South Branch of the Saskatchewan, from an equivalent of Formation No. 4 of the Nebraska Cretaceous series.]

FORMATION NO. 5 OF VERTICAL SECTION.

This very interesting bed, though differing lithologically from the preceding one, contains many of the same species of fossils. It is worthy, however, of a distinct position in the series, not only from its extent, thickness, and difference of composition, but also from the more favourable influence that it exerts upon the country underlaid by it. In ascending the Missouri River it first makes its appearance near the mouth of Grand River, about 150 miles above Fort Pierre. Near *Butte aux Grès* it becomes quite conspicuous, acquiring a thickness of eighty or one hundred feet, and containing great quantities of organic remains. Here it forms an extension of what is called Fox Ridge, a series of high hills having a north-west and south-east course, crossing the Missouri River into Minnesota at this point. Its north-eastern limits I have not ascertained. In its south-western extension it continues for a considerable distance nearly parallel with the Missouri, crosses the Moreau River about thirty miles above its mouth, then forms a high dividing ridge between the Moreau and Sheyenne Rivers, at which locality it first took its name. Continuing thence its south-westerly course, it crosses the Sheyenne, and is seen again in its full thickness at the heads of Opening

Creek and Teton River, forming a high ridge from which tributaries of the Sheyenne and Teton take their rise. The little streams flowing into the Sheyenne have a north-westerly course, while those emptying into the Teton take a south-easterly direction. We thus find that this bed underlies an area of about 200 miles in length and fifty miles in breadth, or about 10,000 square miles.

The general character of Formation No. 5 is a yellow arenaceous and argillaceous grit, containing much ferruginous matter, and in localities a profusion of molluscous fossils. It forms a much more fertile soil, more hearty and luxuriant vegetation, sustains a finer growth of timber than Formation No. 4, and abounds in springs of good water.

Like No. 4, this bed yields a great abundance of quite perfect and well-preserved organic remains. Many of the species approximate so closely to Tertiary forms, that did we not find them everywhere associated with Ammonites, Scaphites and other genera which are not known to have existed later than the Cretaceous epoch, we should at once pronounce the formation in which they occur, Tertiary. The whole thickness of this bed is estimated at 100 to 150 feet.]

The rocks at La Roche Percée near the boundary line (long. 103° 59′), with their associated coal beds, described by Dr. Hector, are probably of the age of No. 5, as well as those seen by the same gentleman on the west side of the outer range of hills close to the main chain of the Rocky Mountains.

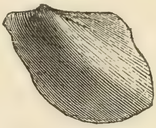
An exposure of this formation occurs on the Eyebrow Hill stream, where it joins the Qu'appelle Valley. A ferruginous clay in yellow and red layers reposes on a hard greenish-coloured sandstone, seamed with veins of selenite, and containing huge concretions. No fossils were found in the rock.

The upper part of the section on the South Branch, containing concretions full of *Avicula Nebrascana*, is doubtless the representative of No. 5 in this region.

[Several of the specimens obtained near Sand Hill Lake on Qu'appelle River, and the South Branch of the Saskatchewan, are from a green sandstone, which is more indurated, but in other respects more like the green sands of New Jersey, than any I have before seen from north-western localities. In some of these, there are great numbers of *Avicula linguæformis* and *A. Nebrascana*, the first of which occurs in both Nos. 4 and 5 of the Nebraska section, but is more abundant in the latter ; and the other is nearly or quite restricted to No. 5, where the two formations are not blended as is sometimes the case. As this rock differs entirely in its lithological characters from Formation No. 4,—while No. 5 is often highly arenaceous, and sometimes assumes a slight greenish tinge, at the higher northern localities in the Upper Missouri country,—the probability is that it represents No. 5, or the most recent member of the Cretaceous Series of the north-west.]

Among the specimens procured from the South Branch were *Scaphites Conradi*, *Nautilus Dekayi*, *Avicula linguæformis*, *Avicula Nebrascana*, *Rostellaria Americana.*

Avicula Linguæformis.

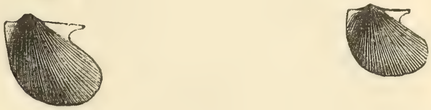


An imperfect specimen of this species. The lines represent shading.

[*Avicula linguæformis*, Evans and Shumard, Proceed. Acad. Nat. Sci. Phila., vol. vii. p. 163.

Locality and position.—Sandy Hills, South Branch of the Saskatchewan. Height of Land in the Qu'appelle Valley, near the Elbow of South Branch of the Saskatchewan.—Upper Cretaceous.]

Avicula Nebrascana.

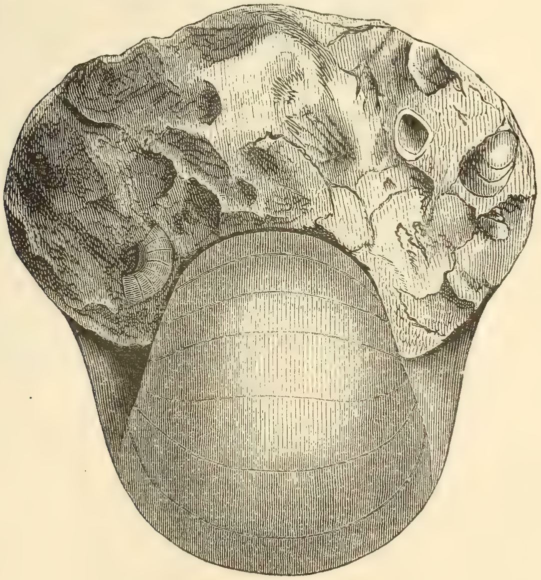


Two specimens of this species.

[*Avicula Nebrascana*, Evans and Shumard, Trans. Acad. Sci. St. Louis, vol. i. p. 38.

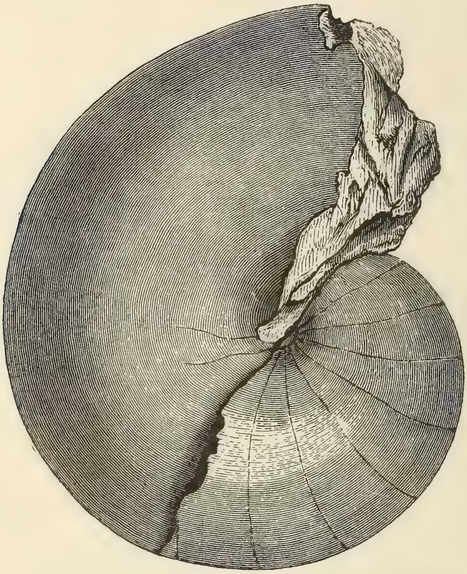
Locality and position.—South Branch of the Saskatchewan.—Upper Cretaceous.]

Nautilus Dekayi.



Front view.

Nautilus Dekayi.—Morton, 1834. Synop. Org. Rem., pl. viii. fig. 4, and pl. xiii. fig. 4.



Side view of Nautilus Dekayi.

Locality and position.—South Branch of the Saskatchewan.—Upper Cretaceous.

Rostellaria Americana.

Rostellaria Americana.—Evans and Shumard, Trans. St. Louis Acad. Sci., vol. i. p. 42.

Locality and position.—South Branch of the Saskatchewan.—Upper Cretaceous.

Scaphites Conradi.

Ammonites Conradi.—Morton, 1834. Synop. Org. Rem., p. 39, pl. xix. fig. 4.

Scaphites Conradi.—D'Orbigny, 1850. Prodromus, p. 214.

Ammonites Nebrascensis, &c.—Owen, 1852. Rep. Iowa, &c.

Scaphites Conradi.—Meek and Hayden, 1856. Acad. Nat. Sci. Phila., p. 281.

Locality and position.—South Branch of the Saskatchewan.—No. 5, Nebraska Section, or most recent Cretaceous.

TERTIARY FORMATIONS.

No evidence of Tertiary rocks in position east of the South Branch of the Saskatchewan was obtained during the exploration.

On the crest and abrupt sides of the Riding, Porcupine, and Thunder Mountains, the Indians affirm that beds of Lignite exist, a statement rendered probable by the occurrence of worn fragments in the drift of the valleys of the rivers flowing from those eminences.

But this does not establish the existence of Tertiary rocks on these elevations or their flanks, for Dr. Hector found at La Roche Percée, near the flanks of the Grand Coteau, Lignite bands in a formation which much resembles Formation No. 5 of the Nebraska section, and from the occurrence of the underlying formation on the Riding Mountain, it is not improbable that Formation No. 5 is found in position there with associated beds of Lignite.

The sand dunes, which form so distinguishing a feature near the Elbow of the South Branch, may have been derived from Tertiary sandstones formerly overlying the upper Cretaceous rocks in that vicinity. In a foot-note on page 139 of the Geology and Palæontology of the Mexican Boundary Line, Prof. James Hall says that the drifting sands of the south-west, like those of the north, appear to be derived from the sandstones of the Tertiary period.

In the Upper Saskatchewan, Tertiaries containing Coal or Lignite are well developed ; also on the flanks of the Rocky Mountains. They are mentioned in the following notices of the Lignites of the north-west.

TERTIARY COAL, OR LIGNITE.

Although the Lignites are not generally available for economic purposes, yet some seams sufficiently pure for use are known to exist in the great Lignite basin of the Upper Missouri and Saskatchewan. A brief notice of the character of this important material as it occurs in the Tertiary rocks of the North-West, will enable a tolerably accurate judgment to be formed of its probable value as a source of fuel in Rupert's Land.

The great Lignite Basin of the Missouri extends from the 100th to the 108th degree of west longitude, and from the 45th degree of north latitude to an undescribed limit, probably through the Valley of the Saskatchewan to the Valley of the Mackenzie.

Dr. Hayden, who traced the great Missouri formation up that river for a distance of 600 miles, and up the Yellowstone for 300 miles, considers that the fossils obtained from it show conclusively, that it possesses the mixed character of a fresh water and estuary deposit, and that it cannot be older than the Miocene period. It is composed of clays, sands, sandstones, and Lignites. The extent of country known to be occupied by this basin, as it occurs on the Missouri and its tributaries, exceeds 60,000 miles. The beds of Lignite in this extensive formation vary in thickness as well as in purity at different localities. On the Yellowstone they are found seven feet in thickness. At Fort Berthold on the Missouri a two-foot bed is pure enough to be used as fuel.*

Governor Stevens states, in his Report of the Exploration of a route for the Pacific Railway, that Lignite has been traced from the Coulées of the Mouse (Little Souris) River to the head waters of Milk River, a distance of 500 miles, *apparently* underlying the whole of that extensive district of country, with a thickness of bed varying from a few inches to six feet; he regards it as a source of fuel not to be overlooked.†

The Coal or Lignite at Edmonton occurs in three or four beds, the principal of which is from four to six feet thick. Dr. Hector says that it is of very inferior quality, burns with no flame, but rather smoulders away, leaving a plentiful ash. It is used in the forge at the Fort, and found to answer tolerably well. At Rocky Mountain House, Dr. Hector found the beds containing Tertiary coal exposed on the banks of the Saskatchewan, but no bed exceeded two feet in thickness. The coal-bearing strata are exhibited more or less all the way from Rocky Mountain House to Fort Edmonton, 211 miles by the river. Four miles below this place the coal was seen by Dr. Hector for the last time in descending the river on the ice, and eighty miles below the Fort the associated beds disappear, and upper Cretaceous rocks come to the surface conformably.‡

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* Page 9. Remarks on the Tertiary and Cretaceous Formations of Nebraska, &c.. by F. B. Meek and F. V. Hayden, M.D.

† Pacific Railway Reports, vol. i. p. 95.

‡ Blue Book.

An extensive deposit of Tertiary coal was found by the same gentleman on Red Deer River, in lat. 52° 12′ N. long. 113° W. associated with the same sands and clays as at Edmonton. One group of three beds measured twenty feet in thickness, of which twelve feet was pure coal, the remainder being carbonaceous clays. This deposit on Red Deer River extends over fourteen miles.

On the South Branch they are said to exist, by Sir Alexander Mackenzie, in long. 116° W.; but as the country between the Elbow and the mouth of Bow River is still in part a *terra incognita*, it is not improbable that important Lignite beds may be found much further east than the longitude specified by that illustrious traveler.*

At Nanino, Vancouver's Island, lignite beds, long conjectured to be of Tertiary age, but now known to be Cretaceous (Dr. Hector), have been worked to some extent for the San Francisco market, and to supply steamers which touch there.†

Some years since Dr. Evans, U. S. Geo., described the coal of Oregon and British Columbia. He says, "These coals do not belong to the true coal measures but to the Tertiary period; they have, however, been altered by volcanic action. The Bellingham Bay coal particularly, in consequence, is of a remarkable crystalline structure, and presents under the magnifier a very singular and beautiful appearance. It will produce excellent coke, and is well-suited to manufacturing and domestic purposes. It burns freely and although rather light for long sea voyages, unless the construction of furnaces should be changed, lessening the draft, is suitable for river navigation. The coal crops out at various points from the British line to near Port Oxford in Oregon, and is accessible to sail and steam navigation, and almost inexhaustible in quantity. These coals with imperfect machines and facilities for mining can be delivered ready for shipment at from 2$ to 3$ per ton."

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* Foot note, page 110, Am. Ed. Sir John Richardson's Arctic Searching Expedition.

† Pacific Railway Report, vol. vi., Geological Report.

Beds of Lignite are found at many places in Texas. A bed four feet thick occurs on the Colorado, near Bastrop, beneath a layer of Eocene fossils. This mineral is also found on the Brazos*, and exists in abundance on the Rio del Norte, the river forming part of the boundary line between the United States and Mexico. Some specimens in the last-named locality are so bituminous as to be of no use in the blacksmith's forge, where it runs together and becomes baked into a solid mass. Seams of Lignite three to four feet thick are exposed on Elm Creek, a tributary of the Del Norte, and have been used and found valuable in a blacksmith's forge. This Lignite occurs in Cretaceous formations.

The occurrence of extensive Lignite beds in the valley of the Mackenzie is well-known, and from the foregoing enumeration of their distribution in Tertiary and Cretaceous formations, it is evident that more or less continuous areas of this important mineral are to be found, along the flanks of the Rocky Mountains, from Mexico to the Arctic Sea.

In Europe it is well-known that Tertiary Lignite deposits possess considerable economic value. They are worked in France, Germany, and Switzerland. In England, the Lignites of Devonshire, associated with beds of clay, are about seventy feet thick. The strata of Lignite coal near the surface vary from eighteen inches to four feet in thickness, separated by beds of brownish-clay of about the same dimensions. The lowermost stratum of Lignite coal is sixteen feet thick.*

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* Blake, Pacific Railway Reports, vol. ii.

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* Phillips.

CLIMATE

OF THE

SOUTHERN PART OF RUPERT'S LAND

CHAP. XLI.

Climate of the Laurentides and the Prairies. — Frozen Lakes. — Mean Annual Temperature.—Arid and Humid Region.—Sources of Humidity.—Aridity West of the 98th Meridian.—Mississippi Valley.—Arid Region of the United States.—Humid Region of the Valley of Lake Winnipeg.—Causes of.—Elevation of the Country.—Humid Pacific Winds.—North-easterly Current.—The Arid Region.—Prevailing Winds.—Source of the Humidity.—Rocky Mountain Plateau.—Depression in.—Table of Elevation of Plateau and Passes.—Hail Storms.—Thunder Storms in 1858.—Progress of Dunes.—Summer Surface Wind.—Meteorology of Red River.—Winter Temperatures. — Winter Temperatures at Montreal. — Cold Terms.—Quebec Temperatures.—Climate of the South Branch of the Saskatchewan.—Limit of permanently frozen Soil.—Growth of Forests.—Tail of the Prairies.—Prairies Converted into Forest Land in Missouri.—Character of the Great Plains in the United States.—Major Emory's Statement. — Auroras. — October 2nd. — October 27th. — The Twilight Bow.—Indian Summer.

The climates of Canada and Rupert's Land under the same parallels of latitude, vary to a considerable extent with the rock formations of the country. Throughout the undulating region of the Laurentides, between Lake Superior and Lake Winnipeg, the proportion of water to dry land is about one to two, not collected into one large water area, but distributed over the surface of the country in the form of countless thousands of lakes, ponds, and marshes. The intense cold of winter is sufficient to solidify the deepest lakes for a depth of several feet, and the thawing of so much ice in spring has the effect of absorbing and rendering latent the heat which would be otherwise expended in warming the soil and advancing vegetation.

Lakes Winnipeg, Manitobah, and Winnipego-sis, together with the smaller lakes belonging to the Winnipeg basin, are deeply frozen every winter ; ice often remains in their northern extremities until the beginning of June and greatly retards the progress of vegetation on their immediate shores. The country is clothed with forests giving rise to swamps where water accumulates. The prairies are fully exposed to solar radiation and soon part with their superabundant humidity. Hence one reason that, north of the 47th or 48th parallel, the mildness of the seasons increases rapidly as we advance towards the west, after leaving Red River. The improvement arises not only from greater longitude, but is influenced by the character of the rock formations by which the country is underlaid and surrounded. The soil of the prairies is in general dry and is rapidly warmed by the rays of the sun in spring. The prairies enjoy too, north of the 58th parallel, the genial, warm and comparatively humid winds from the Pacific, which are felt as far north as the latitude of Fort Simpson.*

The mean annual temperature of 40°, as determined by the Smithsonian Institution, passes through Canada and Lake Superior, curves northward and leaves the United States for British America at about the 103rd meridian, crossing the South Branch of the Saskatchewan north of the Elbow.

The country embraced within the limits of our explorations may be divided into two regions in relation to climate ; the arid and the humid region. The vast treeless prairie west of the Little Souris lies within that part of the area which receives comparatively a small annual rain-fall. Its northern limit is roughly shown by the Qu'appelle Valley, or more accurately by an imaginary line drawn from the fishing lakes to the Moose Woods. North and east of this area the precipitation is considerably greater, and supplies the valley of the main Saskatchewan, the Touchwood Hill Range, and the Valley of the Assinniboine with an abundance of moisture, which is protected and treasured by forests.

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* Colonel Lefroy; Meteorological observations at Lake Athabasca and Fort Simpson, p. 139.

The valley of Red River east of the Little Souris, or the 101st degree of longitude, receives much humidity from the moist winds coming from the Gulf of Mexico up the Valley of the Mississippi, and over the low height of land which separates the waters of Red River from those of the St. Peter.

The Touchwood Hill Range and the country generally north of the Qu'appelle Valley, and in an easterly direction towards and beyond Lake Winnipeg, are made humid by the south-west Pacific wind, in concurrence with the prevailing east wind of this region. These phenomena are referred to in detail in succeeding paragraphs.

The cause of the aridity and unfitness for settlement of fully one-third of the United States, has been ably discussed by distinguished meteorologists. This remarkable feature, extending over a portion of the American continent within the limits of the United States, of more than 1,000,000 square miles in area, is highly important in relation to the valley of the South Branch of the Saskatchewan, to a large part of which the same peculiarity belongs. The physical geography of the arid region in the United States has been very admirably described by Dr. Joseph Henry.*

" The general character of the soil between the Mississippi River and the Atlantic is that of great fertility, and as a whole, in its natural condition, with some exceptions at the west, is well supplied with timber. The portion also on the western side of the Mississippi, as far as the 98th meridian, including the States of Texas, Louisiana, Arkansas, Missouri, Iowa, and Minnesota, and portions of the territory of Kansas and Nebraska, are fertile, though abounding in prairies and subject occasionally to droughts. But the whole space to the west, between the 98th meridian and the Rocky Mountains, denominated the Great American Plains, is a barren waste, over which the eye may roam to the extent of the visible horizon with scarcely an object to break the monotony.

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* Meteorology in its Connexion with Agriculture, by Professor Joseph Henry, Secretary of the Smithsonian Institution.

"From the Rocky Mountains to the Pacific, with the exception of the rich but narrow belt along the ocean, the country may also be considered, in comparison with other portions of the United States, a wilderness unfitted for the uses of the husbandman; although in some of the mountain valleys, as at Salt Lake, by means of irrigation, a precarious supply of food may be obtained sufficient to sustain a considerable population, provided they can be induced to submit to privations from which American citizens generally would shrink. The portions of the mountain system further south are equally inhospitable, though they have been represented to be of a different character. In traversing this region, whole days are frequently passed without meeting a rivulet or spring of water to slake the thirst of the weary traveler.

"We have stated that the entire region west of the 98th degree of west longitude, with the exception of a small portion of western Texas and the narrow border along the Pacific, is a country of comparatively little value to the agriculturist; and, perhaps, it will astonish the reader if we direct his attention to the fact that this line, which passes southward from Lake Winnipeg to the Gulf of Mexico, will divide the whole surface of the United States into two nearly equal parts. This statement, when fully appreciated, will serve to dissipate some of the dreams which have been considered as realities as to the destiny of the western part of the North American continent. Truth, however, transcends even the laudable feelings of pride of country ; and, in order properly to direct the policy of this great confederacy, it is necessary to be well acquainted with the theatre on which its future history is to be enacted and by whose character it will mainly be shaped."

HUMID REGION OF THE VALLEY OF LAKE WINNIPEG.

Prominent among the causes which tend to give humidity, together with an elevated spring and summer temperature, to a part of the valley of Lake Winnipeg, there may be noticed:—First, the comparatively low elevation of the country above the sea level. The prairies of Red River within British territory are not more than 730 feet above the ocean. Those on the South Branch of the Saskatchewan, at the Elbow, do not exceed 1600 feet, and the mean elevation of the country between the South Branch and the Riding Mountain is only 1200 feet above the same level. The influence of the south winds from the Gulf of Mexico on the Red River valley has already been noticed.

Second, the influence of the warm westerly winds from the Pacific Ocean in connexion with the prevailing north-east wind, which is one of the established physical phenomena of this part of British America. It would appear, at first sight, that the snow-capped ridges of the Cascade, Blue, and Rocky Mountains would abstract so much heat from the warm westerly winds coming from the Pacific Ocean, as to neutralize their influence upon the winter and spring temperature of a large part of the country drained by the Saskatchewan. Such, however, is not the case; and happily for the purpose of practically substantiating this apparent anomaly, we have indisputable testimony.

In the magnetical and meteorological observations at Lake Athabasca and Fort Simpson, by Colonel Lefroy, R. A., we find the following important observation, in relation to the phenomena of Pacific winds affecting the climate of the northern regions :—

"A local phenomenon of interest was observed several times at Fort Simpson (lat. 61° 51′ 7″ N., long. 15° 5′ 40″ W.), 460 miles from Sitka (1800 geo. miles from Toronto), in the rapid rise of the temperature of the air, when the wind changed to the south-west from an easterly direction. It appeared as if the warmer air of the Pacific Ocean were transferred across the neighbouring ridges of the Rocky Mountains with little loss of its temperature."

Much of the precipitation in the humid region is due to the Pacific winds, which are not so completely deprived of their moisture in traversing the Rocky Mountain Ranges as in lower latitudes, where the average altitude of these ranges is much higher, and the eastern slope of the mountain of a *far greater mean annual temperature.*

The prevalent winds at Toronto and Lake Athabasca belong, as shown by Colonel Lefroy *, to different and nearly opposite systems. A *north-westerly* current preponderates in the lower latitudes (43° 39′), a *north-easterly* current, inclined at an angle of about 117° prevails in the higher one (58° 45′). Between these latitudes is a region of calm or of variable winds; and there can be no doubt that the north-easterly current materially affects the humidity of the climate of Rupert's Land north of the 50th parallel. The prevalence of north and north-easterly winds during the winter months occasions a great precipitation of snow throughout the humid region. In the Touchwood Hill range, snow not unfrequently accumulates in the woods, where it is undisturbed by winds, to the depth of two feet; on the Riding and Duck Mountain the precipitation is also large, and throughout the humid region very much in excess of the precipitation in lower latitudes.*

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* Magnetical and Meteorological Observations at Lake Athabasca.

Forty-eight inches of rain and thirty-nine inches of snow were registered by Mr. Gunn near the Stone Fort, Red River, between June 1st, 1855, and May 31st, 1856. The precipitation at Toronto during the same period was thirty inches of rain and seventy-two of snow, giving an excess of humidity to the climate of the Red River Settlements, when compared with Toronto, which is represented by fourteen inches, a quantity exceeding the annual precipitation over the greater portion of the eastern flank of the Rocky Mountains south of the great Missouri bend.

The arid region, or Great Plains, west of the 101st degree of longitude, receive a very small amount of precipitation from the humid south winds coming up the Valley of the Mississippi from the Gulf of Mexico. It is too far south to be much affected by north-east winds, or the westerly winds from the Pacific. This vast treeless prairie forms, in fact, the northern limit of the great arid region of the eastern flank of the Rocky Mountains; but still its humidity is greater than that of the plains south of the Missouri, in consequence of its high northern latitude.

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* Compare Lorin Blodget's Rain Charts.

All the thunder-storms we encountered in 1858 in the valley of Lake Winnipeg, came from the west, south-west, or north-west, with one exception. I do not find a single record of thunder-storms with heavy rain coming from the south. This may have been an exceptional year, but the warmth and dryness, often oppressive, of the south wind, west of the 100th degree of longitude, contrasted strongly with the humidity and coolness of winds from the west. This phenomenon is directly opposed to those which prevail in lower latitudes, and may probably be explained as follows: —

Warm air from the Pacific, loaded with moisture, passes at certain periods of the year over the whole range of the Rocky Mountains in British America and in the United States. These Pacific winds occasion but a very small precipitation of rain or snow on the eastern flank of the Rocky Mountains, south of the great Missouri Bend. Similar winds from the Pacific do occasion a considerable precipitation in the northern part of the Saskatchewan Valley. Whence, then, this apparent anomaly? It probably arises from the difference in the temperature of the two regions, the direction of the prevailing winds, and the lowness and comparatively small breadth of the Rocky Mountain ranges in that latitude. In spring and summer, warm westerly winds laden with moisture, in passing over the mountain range south of, say the 46th parallel, are cooled to a certain temperature, and precipitate the greater portion of their moisture in the form of rain or snow upon the mountain ridges. On arriving at the eastern flank of the Rocky Mountains, their temperature rises to that of the region over which they pass, being elevated by the deposition of their moisture and continually increasing density as they descend; but the capacity of air for moisture is well known to be dependent upon its temperature within certain limits; hence the westerly Pacific winds become more warm and more dry as they descend the Eastern Rocky Mountain slope, until they meet the moist winds from the Gulf of Mexico, passing up the Valley of the Mississippi, towards and through the region of the great Canadian Lakes, and over the low height of land separating the waters flowing into Lake Winnipeg from the Mississippi Valley.*

In the latitude of the Valley of the Saskatchewan, however, the moist south-west winds from the Pacific find a depression in the Rocky Mountain range and a low contracted plateau; they lose less humidity than winds passing over the higher and broader ranges to the south, and meet with a prevailing north-easterly wind as they begin to descend their eastern flanks; their temperature is consequently lessened instead of being elevated, and their capacity for moisture diminished; hence, precipitation in the form of rain and hail takes place in descending the slope towards Lake Winnipeg.

There is no doubt that the south-west Pacific winds, passing through the depression in the Rocky Mountains near the 49th parallel, and over the narrow plateau on which they rest, without losing the whole of their moisture, give humidity to the large portion of Rupert's Land they traverse.

The great plateau on which the Rocky Mountain ranges rest, has an average elevation of 4000 feet near the 32nd parallel of latitude, the lowest pass in the most easterly range being there 5717 feet above the ocean. Along the

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* Meteorology in its Connexion with Agriculture, by Professor Joseph Henry.

35th parallel the vertical section across the mountain system is of greater width and elevation. The mean height above the ocean is about 5500 feet, and the lowest pass 7750 feet. Between the 38th and 40th parallel the section has an elevation of 7500 feet, and the lowest pass is 10,032 feet above the level of the sea. Beneath the parallel of 47° the base of the plateau is narrow, and has an average altitude of 2500 feet, the lowest pass being 6044 feet above the ocean.* Within British territory north of the 49th parallel the passes in the eastern range are still lower. The recent measurements by Captain Palliser's Expedition show that the height of the Kutanie Pass in latitude 49° 30′ is nearly 6000 feet above the sea level; the Kananaski Pass 5985 feet, and the Vermilion Pass, traversed by Dr. Hector, in latitude 51° 10′, only 4944 feet above the ocean.

The following table exhibits the elevation of the Rocky Mountain plateau, and the height of the lowest Passes above the ocean: —

Table showing the elevation and breadth of the Plateau on which the Rocky Mountain ranges rest, and the height above the Ocean of the lowest Passes, from the 32nd parallel to the 51st parallel, North Latitude.

	Breadth and Elevation of Plateau between the 32nd and 49th Parallels.						
	3000 and 4000 feet.	4000 and 5000 feet.	5000 and 6000 feet.	6000 and 7000 feet.	7000 and 8000 feet.	8000 and 9000 feet.	9000 and 10,000 feet.
	miles.	*miles.*	*miles.*	*miles.*	*miles.*	*miles.*	*miles.*
32nd parallel	170	503	60				
35th ,,	185	160	303	235	95		
38th and 39th parallel	143	725	284	110	155	80	20
41st and 42nd	160	580	285	270	107	20	
47th and 49th†	130	97	28				

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* Dr. J. Henry, "Meteorology in its Connexion with Agriculture."

† Pacific Railroad Explorations.

Summit of the lowest passes above the Ocean from the 32nd to the 51st parallel, North Latitude.

	Feet.		
32nd Parallel	5,717		
35th „	7,472		
38th and 39th Parallel	10,032		
41st and 42nd „	8,372		
47th and 49th „	6,044		
Kutanie Pass, lat. 49° 30′	6,000	nearly	Passes discovered by Captain Palliser's Expedition.*
Kananaskis Pass, north of 49th par.	5,985		
Vermilion Pass, lat. 51° 10′	4,944		

Not only has the depression in the Rocky Mountain range, north of the 47th parallel of latitude, a remarkable effect upon the climate of the Valley of the North Saskatchewan, but its bearing upon means of communication between the Atlantic and Pacific slopes of the Rocky Mountain ranges, is of the greatest importance.

Hail-storms are not unfrequent during the summer months in Rupert's Land, and the prairies sometimes retain the records of their occurrence for many weeks. On the Grand Coteau de Missouri, hail-storms are so violent that the stones have been known to penetrate the buffalo-skin tents of the Indians who hunt on that elevated plateau. The thunder-storms of 1858 are given in the annexed table.

The progress of dunes affords a very excellent indication of the direction and force of prevailing winds. The Devil's Hills and the sand dunes surrounding that dreary waste on the Assinniboine, in long. 99° 40′ W., showed a bare advancing surface towards the north-east, being pushed in that direction by the prevailing south-west wind. The sand dunes at the Height of Land in the Qu'appelle Valley, in long. 107° W., lat. 51° N., were advancing in an easterly direction; their clean surfaces were facing the east. Had they progressed under a prevailing south-west wind, they would long since have

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* Proc. Roy. Geog, Soc. vol. iii. No. 5.

Table showing the number of days on which rain fell, with the character of the Thunder-storms, during the Summer of 1858, *in the Valley of the Assinniboine and Saskatchewan.*

Date.	Time.	Character of Storm.	Locality.
June			
18	2-4 p.m	Heavy rain, thunder . .	Prairie Portage.
19	6 a.m	Slight rain	Do. do.
20	Sunset.	A terrific thunderstorm, heavy rain, high wind . . .	Bad Woods.
21	11 a.m. 1 p.m.	Tremendous thunderstorm, hailstones 1-1½ in. in diameter .	Bear's Head Hill.
21	6 p.m.	Thunderstorm, heavy rain . .	Do. do.
22	3.45 p.m. 6 p.m.	Terrific thunderstorm, continued roar of thunder without intermission for 1½ hours . .	Sandy Hills.
25	8–10 p.m.	Violent thunderstorm, heavy rain	Little Souris.
26–27	Night.	Thunder and rain . . .	Do. do.
29–30	Night.	Thunder and rain . . .	Do. do.
30	6 a.m.	Heavy rain with rolling thunder, without intermission for 1 hour	Do. do.
July			
4	11 a.m.	Rain	Great Prairie.
5	10 p.m.	Lightning in the east, no rain, thermometer in shade 92° at noon	Do. do.
9	9 a.m.	Rain	Assinniboine.
11	3 p.m.	Thunderstorm, hail, and heavy rain	Fort Ellice.
13	7 p.m. 10 p.m.	Thunderstorm of unusual violence and sublimity—*see* narrative .	Qu'appelle Valley.
14	2.30 p.m. to 4.30	Thunder and rain . . .	Do. do.
14–15	Night.	Rain all last night . . .	Do. do.
15	. .	Rain North of Qu'appelle temp. at 6 a.m. 45°	
18	11 p.m.	Heavy rain and thunder . .	Qu'appelle.
19	4 p.m.	Rain North of Qu'appelle Valley	
22	Noon.	Violent thunderstorm with heavy rain and hail	Do.
28	1 p.m.	Rain in torrents . . .	Do.
August			
2	4 p.m.	Heavy thunderstorm with rain .	South Branch.
4	4.30 p.m.	Thunderstorm, heavy rain . .	Do. do.
5	. .	Heavy rain	Do. do.
11	6 p.m.	Violent thunderstorm . .	Long Creek & Main Saskatchewan.
18	6 p.m.	Thunderstorm, rain and high wind	Main Saskatchewan.
25	Noon.	Violent thunderstorm and rain .	Do. do.

invaded and filled up the Valley of the Qu'appelle. These existing records of prevailing winds during the period when the dunes are not frozen, show that while the south-west is the most effective as a summer surface wind in Rupert's Land under the 99th meridian, on the South Branch of the Saskatchewan, eight degrees further west, westerly winds prevail.

THE CLIMATE OF THE VALLEY OF THE RED RIVER.

The climate of the Valley of Red River exhibits the extremes of many characteristics which belong to the interior of continents in corresponding latitudes. High summer temperatures, with winter cold of extraordinary severity appear to prevail in the district called Assinniboia, as in the interior of North-Eastern Europe and Asia. It cannot fail to be noticed, however, that the general absence of late spring and early autumn frosts, with an abundant fall of rain during the agricultural months, are its distinguishing features in relation to husbandry. The melon, growing in the open air and arriving at perfect maturity in August and September, Indian corn succeeding invariably when due precautions are used to ensure ripening before the middle of September, are strong proofs of the almost uniform absence of summer frosts.

A comparison with the climate of Toronto * for corresponding months of the years 1855 and 1856, reveals some very curious and interesting facts, which may possess importance. Limiting our attention at present to the summer months we find from inspection of the following table of comparison, that the summer of Red River during the year of comparison was more than

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* This comparison, given on the next page but one, was made by Mr. James Waker, assistant at the Observatory, Toronto.

three degrees warmer than the summer at Toronto, and with this excess of temperature there occurred the unexpected difference of 21·74 inches of rain in favour of Red River during that year.

It must be borne in mind, however, that the results of one year's comparison *are not of much value* in estimating the relative climatic adaptation of regions far apart; nor do they afford sufficient data for a fair estimate of the climate of the locality where the observations were made.

The small difference between the temperature of the spring at Toronto and Red River is an interesting fact. While the summer shows an excess of 3°, the spring gives a deficiency of 2°, so that the mean of the spring and summer months at Red River was nearly one degree higher than the corresponding months at Toronto. No feature in the meteorology of this distant region is likely to excite so much interest as the extraordinary fall of rain during the agricultural months. It is well known that the cause of the sterility of a vast region on the east of the Rocky Mountains, within the limits of the United States, is traced to extreme aridity. The great American desert, which places so vast a barrier between the Mississippi Valley and the west flank of the Rocky Mountains, derives its barrenness from the absence of rain during the summer months. A fall of thirty inches in the Valley of Red River during the summer of 1855, with a corresponding fall of 8·76 at Toronto, shows a remarkable difference in the humidity of the two places, and one which report states is generally maintained in other years.

The following comparisons refer to corresponding months of the same years, and are of course liable to those annual fluctuations to which the climatic elements of all countries are subject. It is very probable that more extended observations will reduce the extremes.

Comparison of the meteorology of Red River Settlement with Toronto, Canada West, with reference to mean temperature, depth of rain and snow, from corresponding observations at both stations, from June, 1855, *to May,* 1856, *inclusive.*

Month.	Mean Temperature.		Rain in inches.		Snow in inches.		Temperature : Rain and Snow at Red River + or — of Toronto.
	Red R.	Toronto.	Red R.	Toronto.	Red R.	Toronto.	
1855.	°	°	°	°	°	°	Summer. Temp. + 3·78 Rain + 21·74 ins. Snow 0·0.
June .	69·10	59·93	6·0	4·07	0·0	0·0	
July .	71·16	67·95	12·0	3·24	0·0	0·0	
August .	63·03	64·06	12·5	1·45	0·0	0·0	
Summer .	67·76	63·98	30·5	8·76	0·0	0·0	
September	59·26	59·49	5·0	5·59	0·0	0·0	Autumn. Temp. — 6·94. Rain — 5·16 ins. Snow + 5·2 ins.
October .	42·20	45·39	0·0	2·48	2·0	0·8	
November	21·19	38·58	2·5	4·59	7·0	3·0	
Autumn .	40·88	47·82	7·5	12·66	9·0	3·8	
1856.							Winter. Temp. — 26·42. Rain—1·85 ins. Snow — 38·8 ins.
December.	–8·31	26·99	0·0	1·85	8·0	29·5	
January .	–10·55	16·02	0·0	0·00	5·0	13·6	
February .	–1·71	15·69	0·0	0·00	6·0	9·7	
Winter .	-6·85	19·57	0·0	1·85	19·0	52·8	
March .	9·09	23·06	0·0	0·00	6·5	16·2	Spring. Temp. — 2·83. Rain + 3·14 ins. Snow — 4·8 ins.
April .	39·83	42·27	6·5	2·78	3·0	0·1	
May .	58·46	50·52	4·0	4·58	2·0	Inap.	
Spring .	35·79	38·62	10·5	7·36	11·5	6·3	
Annual .	34·38	42·50	48·5	30·63	39·5	72·9	

Annual.

Colder mean temperature	8°12
More rain	17·87 inches
Less snow	33·4 ”
More moisture and most probably less evaporation .	14·53

At Quebec the difference between the mean temperature of summer and winter is 53°93 ; at Fort Snelling 56°81 ; and at Red River Settlement 74°61 in 1855.

The summer temperature of Red River, and the absence of frosts during that season, determine its fitness for agricultural purposes. The following table exhibits a comparison, based upon *one year's observation only*, between the summer temperature of the Settlement and various other well known places in Canada:—

Summer temperature at Red River Settlement	67·76
Montreal, Canada	66·62
Quebec	62·91
Toronto	63·98

Assuming that the annual mean of 34·38 deduced from the following tables is within two or three degrees of what would be the results of several years' observation, we find upon inspection of Dove Tables, that there is not one locality within the limits of the United States where so low an annual mean occurs. At Kasan (Russia) lat. 55°48, long. 49°7, the mean of ten years was 35°45, and the difference between the hottest and coldest months 61°33, while at Red River the difference was 82°15 in 1855. The difference between summer and winter at Kasan was 56°00; at Red River 74°61. At Orenburg, lat. 50°46, or in nearly the same latitude as that part of Red River Settlement where these observations were made, and in long. 55°6, the annual mean is 35°6; the difference between the hottest and coldest month 66°38, and the difference between winter and summer 59°66. The following table will exhibit this relation at a glance:—

	Latitude.	Longitude.	Annual Mean.	Difference between Hottest and Coldest Months.	Difference between Summer and Winter.
Red River Settlement (1855)	50°15′	97°W.	34·38	82·15	74·61
Kasan, Russia	55·48	49°7 E.	35·45	61·33	56·00
Orenburg . .	50·46	55·6 E.	35·06	66·38	59·66

SEASONS OF THE VALLEY OF LAKE WINNIPEG.

The natural division of the seasons in the Lake Winnipeg Valley is as follows:—

Spring—April and May.

Summer—June, July, August and part of September.

Autumn—Part of September and October.

Winter—November, December, January, February and March.

The natural division of the seasons is strikingly represented by the early and rapid advance of temperature in May in the valley and prairies of the Saskatchewan; and it is also indicated in a very marked degree by the extension northwards to the same valley, between the 95° and 105° of longitude, of numerous plants, whose geographical distribution, east and west of those limits, has a much more southern climatic boundary. The limits of trees rise with the isothermal lines, and these attain a much higher elevation in the interior of British America than on the Atlantic coast.*

In relation to agriculture, the intensity of winter cold is of comparatively little moment. The elevated spring and summer temperature, combined with the humidity of the region in the Valley of Lake Winnipeg, enable Indian corn and the melon to ripen, if ordinary care is taken in selecting soil and in planting seed.

The extraordinary cold of the winter of 1855 and 1856 at Red River, is shown by the tables for December, January, and February, (Mr. Gunn's observations,) which give a mean of $-6°{\cdot}85$ for the temperature of that season; but if we turn to the records for 1857 and 1858 † we find the mean temperature of the winter to have been

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* Gray.

† Meteorological tables recorded by Mr. Dawson's party.

2°·87, showing a difference of eight degrees in favour of the winter of 1857–58. The temperatures recorded were as follows : —

	1855–56.	1857–58.
December	−8·31	−9·11
January	−10·55	−6·2
February	−1·71	−6·68
Winter Mean	−6·85	−2·87

The thermometers supplied to the Red River Expedition in 1857, were made by Negretti and Zambra, and were of the best construction.* They had been compared with a standard at the Provincial Observatory, and their errors recorded, but it does not appear that the proper corrections were made after each observation. Mr. Gunn's thermometer was an ordinary instrument, and, like many of its class, liable to errors at low temperatures. It is, therefore, probable that his winter temperatures are too low, and that the true mean of the winter months at Red River, and consequently the annual mean, may be considerably higher than it appears from his observations.

The cold of February 1858 was exceptional. At Montreal it was the coldest February on record, being 14°·05 below the mean temperature of February, 1857.† But it cannot be denied that the winter cold of Red River is excessive, and the temperature sometimes falls so low as to freeze mercury in a few minutes.

The meteorological register kept at the Stone Fort,

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* These thermometers, together with other meteorological apparatus, were furnished to the different members of the Red River Expedition in 1857, by the permission of the Rev. Dr. Ryerson, Chief Superintendent of Schools, from the stock of instruments provided by the Chief Superintendent for observatories attached to the Grammar Schools throughout the Province. The thermometers were compared and their errors determined and tabulated at the Provincial Observatory. A table of errors was attached to each instrument.

† Records of St. Martin's Observatory, Isle Jesus.

Lower Settlement, in 1847, under the superintendence of Captain Moody *, from which extracts were permitted to be made by Dr. Owen, furnish trustworthy evidence respecting the severity of the climate in winter.

The mean temperature for January 1847, was – 12°·5. Observations being taken at 9 A.M., 3 P.M., and 9 P.M. During twenty-two consecutive days of this period, from the 5th to the 26th inclusive, the thermometer never once rose to zero. The lowest temperature reached was – 48°, the highest 30°, giving a range of 78°. On the coldest day, the 20th, when the thermometer showed – 48° at the Stone Fort, and – 47° at Fort Garry, mercury froze in fifteen to twenty minutes when exposed in bullet moulds.

Although there is no record of cold terms in Canada approaching the extreme low temperature and extending over so long a period as those instanced above, yet cold terms of great intensity are not uncommon in Lower Canada. In the excellent observatory of Dr. Smallwood's at Isle Jesus, nine miles west of Montreal, the following records of cold terms have been preserved †:—

Low Temperatures at Isle Jesus, Nine Miles west of Montreal. C.E.

On the 22nd and 23rd Dec., 1854.

22nd.—8 A.M.,	31·6	below zero.	12 P.M.,	34·8	„
9 „	27·0	„	23rd.—6 A.M.,	36·2	„
10 „	19·1	„	7 „	36·0	„
11 „	17·8	„	8 „	34·3	„
12 „	16·6	„	10 „	24·1	„
1 P.M.,	12·1	„	12 „	13·4	„
2 „	11·8	„	2 P.M.,	12·6	„
3 „	8·1	„	4 „	9·1	„
7 „	23·4	„	6 „	12·6	„
8 „	26·9	„	10 „	9·1	„
10 „	28·2	below zero.			

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* See Dr. Owen's Geological Survey of Wisconsin, Iowa, and Minnesota, page 181.

† *Canadian Journal* for 1855, and *The Canadian Naturalist* for April, 1859.

On the 9th, 10th and 11th Jan., 1859.

9th.—6 A.M.,	29·9	below zero.
7 ,,	29·0	"
9 ,,	28·4	"
12 ,,	23·8	"
2 P.M.,	21·5	"
9 ,,	33·9	"
10 ,,	34·2	"
12 ,,	36·0	"
10th.—6 A.M.,	43·6	"
7 ,,	43·1	"
9 ,,	41·6	"
12 ,,	20·1	"
2 P.M.,	14·3	below zero.
9 ,,	28·8	"
10 ,,	29·2	"
12 ,,	31·6	"
11th.—6 A.M.,	37·1	"
7 ,,	36·9	"
12 ,,	24·8	"
2 P.M.,	19·9	"
9 ,,	21·0	"
10 ,,	21·6	"
12 ,,	18·1	"

In January, 1859, the thermometer did not rise above zero during a period of 124 hours 30 minutes, or more than five days. Mercury froze in the open air. The mean temperature on the 9th was – 27°·8; 10th, – 29°·0; 11th, – 28°·2. Dr. Smallwood says that this cold term was felt generally throughout Canada and the Eastern States, and seems to have traveled from the west.

The following minimum temperatures were observed at different places :—

Rochester	10·0	below zero.
Brooklyn, (New York,)	9·0	"
Boston	14·0	"
Toronto	26·5	"
Quebec	40·1	"
Huntingdon	44·0	"

For the purpose of comparing the monthly mean at Quebec (lat. 46° 49′ 2″, long. 71° 16′) with those of Red River, the table on the opposite page is inserted.*

In the absence of instrumental observations, the progress of vegetation affords the best indication of climate, apart from latitude and elevation above the sea. It has been observed elsewhere that there exists an extraordinary

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* See *Canadian Journal*—Old Series.

Months.	Mean.	Maximum.	Minimum.
1854.			
October	46·05	64·7	+31·6
November	31·83	59·8	+10·0
December	13·08	36·6	- 19·2
1855.			
January	16·70	46·0	- 14·0
February	10·55	36·8	- 29·5
March	21·06	47·3	2·4
April	34·14	59·8	5·9
May	49·03	83·0	32·0
June	58·34	88·0	43·2
July	68·86	90·3	51·9
August	61·54	85·0	38·3
September	55·15	81·3	34·7
October	45·43	60·4	28·4
November	28·75	34·3	21·81
December	18·09	40·1	- 19·2
1856.			
January	8·19	27·0	- 16·5
February	11·99	31·9	- 18·0
March	17·60	39·0	-11·0
April	36·90	55·3	6·4

difference between the characteristic fruit tree of the South Branch, the Misaskatomina (*Amelanchier Canadensis*), and the same tree on the North Branch of the Saskatchewan. On the South Branch at the Elbow, and for forty miles down the river, this shrub attains an altitude of twenty feet, with a stem fully three or three and a half inches through; the fruit is large and very juicy; the size of the berry there is equal to the largest black currant, resembling a small grape more than any other fruit.

The period of flowering and fruiting is about three weeks earlier in latitude 51° than between 53rd and 54th parallels west of the 100° of longitude. The prairies of the Assinniboine, of the Qu'appelle, and of the South Branch of the Elbow, are decorated with brilliant spring flowers, and covered with luxuriant herbage, at a time when ice still lingers at the head of Lake Winnipeg, or chills the air and arrests vegetation in Cedar and Cross Lakes on the Main Saskatchewan. Two and a half degrees north of Cumberland, the soil is permanently frozen three feet below the surface. Sir John Richardson relates that in 1851 he did not disengage his canoes from the ice at the upper end of Lake Winnipeg until the 9th of June. At the Touchwood Hills, horses are allowed to remain in the open air all the winter, finding sufficient pasture under the snow to keep them in good condition.

The vegetable in the gardens attached to Fort à la Corne, with a brief notice of the periods of planting and gathering, will show that the climatic adaptation of the North Branch near the Grand Forks is not of a character unfavourable to agricultural operations. As this subject is one of great importance I have introduced some extracts from the journal of the Fort, which are both interesting and valuable. More extended extracts from this journal will be found in the Appendix.

On the 7th August, in the garden attached to Fort à la Corne (about 18 miles below the Grand Forks), potatoes were in flower, and the tubers of early varieties of the size of hens' eggs. Cabbages were well formed; beetroots and carrots quite ready for the kitchen; Indian corn in silk, from seed which was grown in the garden last year, and peas ready for gathering.

No disease has yet been noticed in the potatoes; and the grasshoppers, that scourge of the country south of the Touchwood Hills, have not made their appearance at Fort à la Corne.

In the garden attached to the Nepowewin Mission, under the charge of the Rev. Henry Budd (a zealous missionary of native origin), all the vegetables gave promise of fair and remunerative crops. The potatoes were superb; turnips, both Swedes and white, remarkably fine; Indian corn, from seed grown on the spot last year, in silk; wheat rather too rank in the stalk — it measured five feet three inches in length to the ear, which was well formed but green, and it seemed doubtful whether it would ripen. Mr. Budd speaks very favourably of the soil, climate, and extent of land available for agricultural purposes. Both the mission and the fort are situated within the excavated Valley of the Saskatchewan, and are not so favourably placed for farming purposes as they might be in the Valley of Long Creek. The river, however, is the great highway, and, during the summer season, affords an abundant supply of sturgeon.

Extracts from the Journal at Fort à la Corne, Saskatchewan River. Lat. 53°·27 ; *long.* 104°·30 W.

1851, October 25th, ice made its appearance in the river. 1852, April 8th, ice solid for the season of the year; 12th, ice started; 13th, ice drifting and lodging on the banks; 21st, ice drifting and disappearing along the banks; 22nd, garden operations commenced. May 14th, first sturgeon caught; 24th, planted potatoes; October 11th, finished taking up potatoes; 25th, fishing season ended; 26th, snow. November 3rd, ice floating in the river. 1854, April 14th, river broke up; on the 15th nearly clear of ice; 28th, garden operations commenced. May 1st, first sturgeon caught; 8th, preparing potato fields; 13th, potato planting. October 2nd, gathered turnips; 3rd, taking up carrots; 10th, commenced taking up potatoes at the mission (190 kegs), turnips, carrots, cabbages— large and good; 11th, cabbages taken up. 1855, May 24th, turnips sown. September 12th, hard frost over night; 27th, took up potatoes—poor crop, much destroyed by grubs; 29th, hard frost; a little ice seen at the gates. October 1st, women digging potatoes; 2nd, ditto; 3rd, taking up turnips; 22nd, ice on the edges of river. 1856, April 2nd, hard frost last night; 4th, water making its appearance on the edges of the river; 7th, froze hard last night; 9th, ice made a start; 17th ice drifting; 23rd, fall of snow during the night: 23rd, nets set, one sturgeon caught; 25th, hard frost. May 2nd, garden operations commenced; 10th, storm of snow; 12th, planted potatoes; 14th, sowed Swedes. September 16th, slight frost last night. October 2nd, commenced taking up potatoes; 22nd, hard frost during the night; 23rd, severe frost during night; 86th, snow in night. November 11th, river full of ice. 1857, April 9th, water appearing on the edges of the river: snow shoes required everywhere; 16th, ice started to-day; 24th, snowed without intermission the whole day. May 3rd, ice drifting all last night; 5th, river full of ice; 12th, planted potatoes and onions; 20th, planting potatoes; three sturgeons caught. June 2nd, hard frost last night; 30th, starvation is staring the people in the face. Have caught no sturgeon for some time back.* 1858, April 21st, ice drifting; large quantities of ice on the banks. May 1st, clearing up of north garden; 7th, preparing potato ground; first sturgeon caught; 12th, planted potatoes; 17th, slight fall of snow; 18th, wind from N. and cold. Think we are going to have a second winter.

The growth of forests is very intimately connected with the climate of a large extent of country. That forests once covered a vast area in Rupert's Land there is no reason to doubt. Not only do the traditions of the natives refer to former forests, but the remains of many still exist as detached groves in secluded valleys, also on the crests of hills, or in the form of blackened prostrated trunks covered with rich grass, and sometimes with vegetable mould or drifted sand. The agent, which has caused the destruction of the forests that once covered many parts of the prairies is undoubtedly fire, and the same swift and effectual destroyer prevents the new growth from acquiring dimensions which would enable it to check their annual progress. Nearly everywhere, with the exception of the treeless, arid prairie west of the Souris, and west of Long Lake on the north side of the Qu'appelle, young willows and aspens were showing themselves in 1858, where fire had not been on the previous year. South of the Assiniboine and Qu'appelle few plains had escaped the conflagration in 1857, and the blackened shoots of willow were visible as bushes, clumps, or wide-spreading thickets where the fire had passed.

The end or tail of the prairies is at Fort Liard, a short distance to the south of Fort Simpson (latitude 61° 51 7″ N.). There is a long high belt of prairie land which runs as far as the neighbourhood of that locality, at the foot of the Rocky Mountains.

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* A common record in the journals at the different posts in Rupert's Land. The cause must be referred to the habits of the people, their occupation, &c., and not to the capabilities of the country.—H. Y. H.

In the State of Missouri, forests have sprung up with wonderful rapidity on the prairies, as the country becomes settled, so as to resist and subdue the encroachment of the annual fires from the west. Missouri lies within the limit of the humid south-west wind coming up the Valley of the Mississippi, and enjoys a greater rainfall than the region west of the 100° of longitude.

GENERAL CHARACTER OF THE REGION WEST OF THE 98TH MERIDIAN IN THE UNITED STATES.

Very great misapprehension has prevailed with regard to the region west of the Mississippi, as well as of the valley drained by the Saskatchewan. Sanguine enthusiasts have laid out new states and territories on the broad map of the Federation, and peopled them in imagination with bustling, industrious, and wealthy communities. Other visionaries have converted the 400,000 square miles drained by the Saskatchewan into a region of unbounded fertility and inexhaustible resources. Whereas a proper appreciation and use of facts will convince the most sanguine, that the larger portion of this area, is, in its present state, unfit for the permanent habitation of man both on account of climate, soil *, and absence of fuel.

The candid opinion of Professor Joseph Henry regarding the adaptation of a large portion of the United States for settlement has been already given; it is confirmed and strengthened by the following excellent summary, from the pen of Major Emory of the United States and Mexican Boundary Commission. It will at once occur to the

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* See "Cretaceous Series," Vol. II.

reader that a knowledge of these facts gives great additional value to the truly fertile valleys of Red River, the Assinniboine, part of the Qu'appelle, and portions of the South and North Branch of the Saskatchewan. It determines also the direction in which efforts should be made to people this great wilderness, and guide the progress of settlement in such a manner as will render the country available for that grand desideratum, a route across the continent:—

"In the fanciful and exaggerated description given by many of the character of the western half of the continent, some have no doubt been influenced by a desire to favour particular routes of travel for the emigrants to follow; others by a desire to commend themselves to the political favour of those interested in the settlement and sale of the lands; but much the greater portion by estimating the soil alone, which is generally good, without giving due weight to the infrequency of rains, or the absence of the necessary humidity in the atmosphere, to produce a profitable vegetation. But be the motive what it may, the influence has been equally unfortunate by directing legislation and the military occupation of the country, as if it were susceptible of continuous settlement from the peaks of the Alleghanies to the shores of the Pacific."

"Hypothetical geography has proceeded far enough in the United States. In no country has it been carried to such an extent, or been attended with more disastrous consequences. This pernicious system was commenced under the eminent auspices of Baron Humboldt, who from a few excursions into Mexico, attempted to figure the whole North American continent. It has been followed by individuals to carry out objects of their own. In this way it has come to pass, that, with no other evidence than that furnished by a party of persons traveling on mule back, at the top of their speed, across the continent, the opinion of the country has been held in suspense upon the subject of the proper route for a railway, and even a preference created in the public mind in favour of a route which actual survey has demonstrated to be the most impracticable of all the routes between the 49th and 32nd parallels of latitude. On the same kind of unsubstantial information maps of the whole continent have been produced and engraved in the highest style of art, and sent forth to receive the patronage of Congress, and the applause of geographical societies at home and abroad, while the substantial contributors to accurate geography have seen their works pilfered and distorted, and themselves overlooked and forgotten." * * *

"The plains or basins which I have described as occurring in the mountain system are not the great plains of North America which are referred to so often in the newspaper literature of the day, in the expressions, 'News from the Plains,' 'Indian Depredations on the Plains,' &c.

"The term 'plains,' is applied to the extensive inclined surface reaching from the base of the Rocky Mountains to the shores of the Gulf of Mexico and the valley of the Mississippi, and form a feature in the geography of the western country as notable as any other. Except on the borders of the streams which traverse the plains in their course to the Valley of the Mississippi, scarcely anything exists deserving the name of vegetation. The soil is composed of disintegrated rocks, covered by a loam an inch or two in thickness, which is composed of the exuviæ of animals and decayed vegetable matter.

"The growth on them is principally a short but nutritious grass, called buffalo grass (*Sysleria dyctaloides*). A narrow strip of alluvial soil, supporting a coarse grass and a few cotton-wood trees, marks the line of the water-courses, which are themselves sufficiently few and far between.

"Whatever may be said to the contrary, these plains west of the 100th meridian are wholly unsusceptible of sustaining an agricultural population, until you reach sufficiently far south to encounter the rains from the tropics.

"The precise limits of these rains I am not prepared to give, but think the Red River (of Louisiana) is, perhaps, as far north as they extend. South of that river the plains are covered with grass of larger and more vigourous growth. That which is most widely spread over the face of the country is the grama or mezquite grass, of which there are many varieties. This is incomparably the most nutritious grass known."*

AURORAS.

On the night of October 2nd, when camped on Water-hen River, an Aurora of unusual brilliancy and character, even in these regions, surprised us with the varied magnificence of its display of light and colour. A broad ring of strong auroral light nearly encircled the Pole Star. It possessed an undulatory motion, and continually shot forth, towards and beyond the zenith, vast waves of faint light. They followed one another like huge pulsations—wave after wave—expanding towards the south with undiminished strength, and continuing many minutes at a time. Suddenly the waves ceased, the luminous belt or ring increased in brilliancy, lost its regular form, and here and there broke into faint streamers, of a pale yellow colour. The streamers, rapidly increasing, soon reached the zenith, and finally meeting beyond it, shot forth from the luminous arc with swift motion and in rapid succession. Their colour varied from straw to pink. The display of streamers is quite common in this part of the continent. The waves are also not unfrequently seen; but none of the half-breeds or the Indians, whom we saw a few days afterwards, had ever witnessed such a brilliant spectacle as the heavens presented during the early part of the night, when the immense pulsations, 14° to 20° in breadth, and expanding in their apparent ascent from east to west, rolled in tranquil, noiseless beauty, through the heavens overhead.

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* Report on the United States and Mexican Boundary Survey, made under the direction of the Secretary of the Interior, by William H. Emory, Major First Cavalry and United States Commissioner. Washington, 1846, pp. 43-47.

At 10 P.M., on the 27th of October, when camped on the shores of Lake Manitobah, near Oak Point, a half-breed awoke me to witness a crimson Aurora of surprising magnificence. Unfortunately a few clouds were flitting athwart the sky, which prevented the centre arc from being visible, but perhaps they increased the depth of the colour. The light was generally steady at the edges of the clouds. The appearance of streamers was recognized only in the clear portions of the sky and above the clouds, where the rose or crimson tints were much fainter. It reminded me of the reflection of a vast prairie on fire; the deep rose and crimson tints lasted for half an hour; then gave way to white and straw-coloured streamers, occasionally tinged with pale emerald green.

Coloured Auroras are not unfrequently seen during the summer months, but they rarely possess the extraordinary beauty of those which have just been described. These beautiful "dancing spirits of the dead" impart a solemnity and charm to the still night, which must ever remain one of its most delightful characteristics in these regions.

THE TWILIGHT BOW.

One of the most beautiful celestial phenomena visible after sunset and before sunrise from the north-western prairies is the Twilight Bow. The extraordinary clearness of the nights during summer in this region offers a very favourable opportunity for witnessing the delicate colouring which is communicated to the lower atmosphere by the reflected light from the upper illuminated portions. As the appearance of the Twilight Bow is dependent upon the serenity of the atmosphere to a great degree, its occurrence is not frequently observed or recorded in this country.

The Twilight Bow, and the causes which produce it, are thus described by M. Bravais*:—" Immediately after the setting of the sun, the curve which forms the separation between the atmospheric zone directly illuminated by the sun, and that which is only illuminated secondarily, or by reflection, receives the name of the *Crepuscular curve* or *Twilight Bow*. Some time after sunset, this bow, in traversing the heavens from east to west, passes the zenith ; this epoch forms the end of civil twilight, and is the moment when planets and stars of the first magnitude begin to be visible. The eastern half of the heavens being then removed beyond solar illumination, night commences to all persons in apartments whose windows open to the east. Still later the Twilight Bow itself disappears in the western horizon; it is then the end of the astronomic twilight; it is closed night. We may estimate that civil twilight ends when the sun has declined 6° below the horizon, and that a decline of 16° is necessary to terminate the astronomic twilight."

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* Annuaire Meteorologique de la France for 1850; quoted by L. W Meek in the Smithsonian Report for 1856.

I often observed the Twilight Bow to be tinged with a delicate rose colour, passing into straw colour, and then into faint emerald green. The line of demarcation between the bow and the illuminated portion of the atmosphere was often very well defined, quite as clearly as in a secondary rainbow. It appeared most brilliant at an altitude of 60° or 70° above the horizon. It descended slowly towards the boundless level, preserving apparently with considerable exactness the form of a parabola. When the Twilight Bow is best developed, the aspect of the prairie is very singular. Towards the east it is cold, cheerless, and gloomy; towards the west it is warm, inspiriting, and suggestive of pleasant thoughts and cheerful anticipations. No wonder the prairie Indians associate delightful dreams of happy hunting-grounds with the setting sun and the beautiful west. They delight to sit silent and thoughtful "in the glory of the sunset," and allow themselves to be transported in imagination

"To the Islands of the Blessed,
To the Kingdom of Ponemah,
To the Land of the hereafter."

INDIAN SUMMER.

Indian summer is a phenomenon of constant yearly occurrence and marked characteristics in the north-west. The following table, kindly furnished from the private memoranda of Mr. James Walker, Assistant at the Provincial Observatory, establishes the fact that the hazy, warm, mellow weather we term Indian summer is a periodical phenomenon in Canada, but the cause does not appear to be quite understood. The characters of Indian summer are more decided in the north-west than in the neighbourhood of Lake Ontario. Sounds are distinctly audible at great distances ; objects are difficult to discern unless close at hand ; the weather is warm and oppressive, the atmosphere hazy and calm, and every object appears to wear a tranquil and drowsy aspect.

Indian Summer at Toronto.—1840 *to* 1859 *inclusive* [20 *years.*]

Year.	Commencement.	Termination.	No of. Days.	Remarks.
1840 .	1st November .	5th November .	5	
1841 .	29th October .	2nd November .	5	
1842 .	28th October .	4th November .	8	
1843 .	23rd October .	25th October .	3	
1844 .	22nd October .	26th October .	5	And 2nd to 7th Nov. (6 days.)
1845 .	24th October .	29th October .	6	
1846 .	4th November .	7th November .	4	
1847 .	28th October .	31st October .	4	
1848 .	20th November .	23rd November .	4	
1849 .	13th November .	18th November .	6	
1850 .	7th November .	13th November .	7	
1851 .	6th October .	11th October .	6	
1852 .	16th November .	21st November .	6	
1853 .	12th October .	20th October .	9	Well marked.
1854 .	24th October .	28th October .	5	Not well marked.
1855 .	16th October .	26th October .	11	Not well marked.
1856 .	19th October .	22nd October .	4	Very dense fog.
1857 .	5th October .	12th October .	8	And 2nd to 8th Nov. (7 days.)
1858 .	18th October .	28th October .	11	
1859 .	2nd November .	8th November .	7	Well marked.
Mean result.	27th October .	2nd November .	6 days.	J. W.

CHAP. XLII.

THE LOCUSTS AND THE FLOODS.

The Locusts.—General Distribution of the Insect.—Distinctions between Crickets, Grasshoppers and Locusts.—The Locust of the North-West.—*Acrydium Femur-rubrum.*—Description of the Insect.—Male and Female.—Accounts of the Appearance of Locusts in the United States and Rupert's Land.—Distribution in 1857 and 1858.—Limits of its Ravages.—Females engaged in laying Eggs.—Vitality of the Eggs.—Power of Flight of this Locust.—Elevation of its Flight above the Sea.—Food of the Insect.—Effect of the periodical Visitations in the Far West and in Rupert's Land.—The Floods.—Flood Years.—Effects of, in 1802.—The Bishop of Rupert's Land Description.—Speculations respecting the Cause of the Floods.—Sudden Melting of an unusual Fall of Snow at the Opening of Spring.

THE LOCUSTS.

The English name grasshopper is almost universally applied to the insect which forms the subject of the present notice. Its general distribution in the United States, and the dreadful ravages which have been produced at different times by innumerable hosts of these insects in the north-western and north-eastern states of the Union, have led to many accounts of its ravages in the newspapers of the day, in all of which it is described under that name. As the insect is not a grasshopper, but a locust, the following description of the difference between grasshoppers, crickets, and locusts, abbreviated from the excellent and most attractive treatise by Dr. Harris on "Insects injurious to Vegetation," is here introduced, with the object of describing to the general reader the true character of this destroyer.

The abundant and prolific jumping orthopterous insects included by Linnæus in his great genus *Gryllus*, and known by the English names of crickets, grasshoppers, and locusts, may thus be distinguished from one another *:—

"1. Crickets (Achetadæ); wing covers, horizontal; antennæ, long and tapering; two tapering, downy bristles at the end of the body, between which, in most of the females there is a long spear-pointed piercer.

"2. Grasshoppers (Gryllidæ); wing covers, sloping; antennæ, long and tapering; feet, with four joints; end of the body in the females provided with a projecting sword or sabre-shaped piercer.

"3. Locusts (Locustadæ); wing covers, roofed; antennæ, rather short and in general not tapering to the end; feet, with three joints; females, without a projecting piercer.

"The various insects included under the name of locusts nearly all agree in having their wing-covers rather long and narrow, and placed obliquely along the sides of the body, meeting and even overlapping for a short distance at their upper edges, which together form a ridge on the back like a sloping roof. Their antennæ are much shorter than those of most grasshoppers, and do not taper towards the end, but are nearly of equal thickness at both extremities; their feet have only three joints, but as the under side of the first joint is marked by one or two cross lines, the feet, when seen only from below, seem to be four or five jointed. The females have not a long projecting piercer like the crickets and grasshoppers, but the extremity of the body is provided with four short, wedge-like pieces, placed in pairs above and below, and opening and shutting opposite to each other, thus forming an instrument like a pair of nippers, only with four short blades instead of two. When one of these insects is about to lay her eggs, she drives these little wedges into the earth; these being opened and withdrawn, enlarge the orifice, upon which the insect inserts them again, and drives them down deeper than before, and repeats the operation above described, until she has formed a perforation large and deep enough to admit nearly the whole of her abdomen."

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* A Treatise on some of the Insects of New England, which are injurious to vegetation, by Thaddeus William Harris, M.D., Boston, 1852.

The locust of the north-west (*Acrydium femur-rubrum*) has been long noticed in the United States, and particularly in New England. In the State of Maine they appeared in such numbers during the years 1743, 1749, 1754, and 1756 that days of fasting and prayer were appointed on account of the threatened calamity.* In Massachusetts and Vermont they showed themselves in 1797 and 1798. In 1838 they appeared in the vicinity of Baltimore in immense numbers.

The following description is from the pen of Dr. Harris:—

Acrydium femur-rubrum—RED-LEGGED LOCUST.

Grizzled with dirty olive and brown; a black spot extending from the eyes along the sides of the thorax; an oblique yellow line on each side of the body beneath the wings; a row of dusky brown spots along the middle of the wing covers, and the hindmost shanks and feet blood red, with black spines. The wings are transparent, with a very pale greenish-yellow tint, next to the body, and are ruled with brown lines. The hindmost thighs have two large spots on the upper side, and the extremity black, but are red below, and yellow on the inside. The appendages at the tip of the body in the male, are of a long triangular form. Length from ¾ to 1 inch, expanded 1¼ to 1¾ inch.

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* Williamson's History of Maine, quoted by Dr. Harris.

The red-legged locust was first described by De Geer, from specimens sent to him from Pennsylvania, and I have retained the scientific name which he gave to it. It is the *Gryllus* (*Locusta*) *erythropus* of Gmelin, and the *Acrydium femorale* of Olivier. It appears to be very generally diffused throughout the United States, and sometimes so greatly abounds in certain places, as to be productive of great injury to vegetation.

The following description was taken down in the prairies west of the Souris, where this insect surrounded us in countless millions, and the air from nine until four was filled with them as with flakes of snow.

Dimensions of the Male Insect.—Length of body, 1 inch; with wings closed 1½ inch; length of wing cases, thirteen lines; of wings, 12½ lines.

Colour.—Of head, bluish-green; of thorax, bluish-green, with two lateral black lines, parallel to the sides of the thorax, and half a line apart; intersected at an acute angle by two short black lines, half a line apart. These marks on the female are more distinct.

Abdomen.—Colour of segments pale bluish-green, with whitish-blue margin; upper portion of each segment dark brown, especially the superior segments; wing cases ash-coloured, with brown spots.

Legs.—Upper surface of posterior legs, brownish-white, with two dark brown spots; outside of the leg red, inside, light red.

Tibia.—Rose-coloured and fringed with two rows of spines. Fore legs yellowish-brown.

Female, differs from the male in the colour of the cheeks, thorax, and upper portion of the abdomen, these parts being of a brighter green. Legs deeper rose-colour; under-side of abdomen yellowish-white. Length of the insect, thirteen lines.

The first authentic account of the appearance of extraordinary swarms of locusts in Rupert's Land that I have met with, assigns the last week of July, 1818, to this event.[*] Every green herb in the settlements at Red River is stated to have been destroyed by these destructive invaders. In 1819 the young brood hatched from the eggs deposited in the preceding year appeared in the spring and consumed the growing wheat crops. "Every vegetable substance was either eaten up or stripped to the bare stalk; the leaves of bushes and the bark of trees shared the same fate; the grain vanished as fast as it appeared above ground leaving no hope either of 'Seed to the sower or bread to the eater.'"[†]

Early in 1819 this pestilence disappeared, but in what manner is not stated.

In 1857 the locusts appeared in countless swarms over a large part of North America. They destroyed nearly all the vegetables cultivated at Fort Randall, long. 98° 35′, lat. 43° 4′, and extended their ravages east as far as the state of Iowa.[‡] During the same year they devoured the crops in part of Minnesota and advanced as far to the north-east as the Lake of the Woods, where I saw them on Garden Island in August. During the autumn of the same year they appeared on the White Horse plains north of the Assinniboine, where they deposited their eggs. The swarms of this insect must have extended as far west as the South Branch of the Saskatchewan and covered the country in a greater or less degree between the Lake of the Woods and the South Branch, a distance in an air line of 560 miles; the perfect insect in 1857, or the young brood in 1858 having been observed nearly continuously over that wide extent of country.

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[*] Alexander Ross.—"The Red River Settlement," &c., 1856.

[†] Ibid.

[‡] Lieutenant Warren.

In a northerly direction they were seen near the Lumpy Hill within sixty miles of the North Branch, also at Dauphin Lake where they had destroyed the crops of Tàwâpit; they had devoured all the crops with the exception of the potato at Fort Pelly before the 1st of August.

The ascertained limits of this mighty army of insects in 1857 extended from the 94th to the 112th meridian, and from the 41st to the 53rd parallel; from the settlements in Utah territory to near the Valley of the North Saskatchewan, and from the Lake of the Woods to the foot of the Rocky Mountains.

The brood from eggs deposited in 1857 at the Touchwood Hills, rose from the ground and took their flight on the 28th July, after destroying every green leaf in the garden of the Post, and leaving sad traces of their ravages in the prairies lying to the south-east. At the time of my visit not one was to be seen, so general had been their departure.

During the month of September, 1857, I saw the females engaged in laying their eggs. They did not limit themselves to the prairie soil in forming a nest, but riddled the decayed trunks of trees, the thatch of houses and barns, the wood of which they were built, everything, indeed, which they could penetrate with the little blades provided for that purpose. The appearance presented by bare patches of soil, such as the road near the settlements, suggested the idea that a vast number of worms had risen to the surface and then retired again after loosely closing the aperture they had made. When in the act of preparing a nest for her eggs, the female was observed to introduce her abdomen into the soil by repeated thrusts to its full length, and then slowly withdrawing it, eject her eggs to the number of ten or twelve in the form of a half cylinder, loosely covering the orifice after the operation was completed.

In the spring of 1858 the young brood were seen at Prairie Portage, hopping over the newly-fallen snow at the latter end of April. It was thought by the settlers that the cold weather which followed the warm days in the early part of the month when the eggs were hatched, would have destroyed the young brood, but it did not appear to have created any sensible diminution in their numbers.

The extraordinary vitality of the eggs of insects is well-known, but when we reflect that the eggs of the red-legged locust are exposed in Rupert's Land to a temperature lower than that at which mercury freezes or more than 40° below zero, as well as to constant alternations of temperature from the freezing point to below zero in the early spring months, their capacity to resist these influences cannot fail to be regarded as one of the most wonderful features in the life of this insect.

Their power of sustaining long flights is also very remarkable. As stated in the narrative they generally rose from the prairie about nine in the morning and alighted about four in the afternoon. During the intermediate hours I do not recollect one instance in which they were observed to alight, except in anticipation of a thunder-storm, when they would descend perpendicularly from a great altitude. Assuming their speed to have been twenty miles an hour, the distance they would fly in one day probably amounted to one hundred and twenty miles. They have been seen hurrying swiftly to the north at an elevation of 14,500 to 15,000 feet above the sea *, thus manifesting extra-

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* Lieutenant Warren.

ordinary capabilities to sustain low temperatures, which would doubtless obtain at that elevation in a region of eternal snows.

Their principal food is the prairie grass and the leaves of shrubs, but they will attack any substances presented to them, even such indigestible articles as leather, traveling bags, woollen garments, saddle girths, and harness. In a few minutes they ate the varnish from the leather case of a telescope I left on the ground in 1858, and so disfigured a valise that the owner who had seen it sound and untouched a few minutes before we stopped to camp, could not recognize it after it had lain ten minutes on the grass. Blankets became instantly covered with them and eaten into holes, the only article of clothing which did not suffer from their voracity was the caoutchouc or gutta percha cloaks and coverings.

The periodical visitations of these locusts have been enumerated among the objectionable features of parts of the Far West, and as some of the obstacles to the settlement of Nebraska.* That they will also exercise an important influence upon the future of the southern part of Rupert's Land, there is but too great reason to fear; already they have twice destroyed the crops in different parts of the Settlements, and in the state of Minnesota in the region about Crow Wing they rendered husbandry hopeless for two years, producing great distress in that newly settled country.

THE FLOODS.

Spring freshets in the valley of Red River sometimes assume the form of wide-spreading devastating floods. The alluvial character of the prairies through which Red

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* Explorations in Nebraska and Dakotah, by Lieutenant Warren, U.S. Top. Eng.

River and the Assinniboine flow is quite sufficient to show that extensive inundations have occurred from time to time during many ages. The accumulations of stratified mud containing the buried trunks and branches of trees are the records of overflows similar to those which caused such distress and consternation in 1826 and 1852. There is good ground for belief that floods have occurred in the district of Assinniboia during the following years: —

1776. On the authority of Mr. Nolin.*
1790. Indian Tradition.†
1809. Indians living in the Settlement when Ross wrote, 1856.
1826.‡ Missionary Register, December, 1826.
1852. "Notes on the Flood," by the Bishop of Rupert's Land.

From the level character of the country of the waters' overflow, the deep trench in which Red River glides towards Lake Winnipeg, a shallow wide-spreading lake soon forms. In 1852 the Bishop of Rupert's Land estimated the breadth of the inundated country to be about twelve miles a short distance below Fort Garry. Although the flood of 1852 was not so high as that of 1826, yet its effects were very severely felt in St. John's and St. Paul's parish and about Fort Garry, but in the parish of St. James, St. Andrew, and the Indian Settlement were almost untouched.§ Houses and barns were swept away in the inundated parishes, and the country for miles on either side assumed the appearance of a lake. Some of the settlers took refuge on the Lake Ridge near St. James's Church, which by leveling we ascertained in 1858 to be eleven feet above the gate of Fort Garry;

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* Mentioned by Ross, in the Red River Settlement, its Rise, Progress, and Present State.

† Ibid.

‡ Ibid.

§ Notes on the Flood at Red River.

others encamped on Stony Mountain, and others again on Bird's Hill opposite Stony Mountain on the east side of the river. These localities and their altitudes above the level of the prairie have already been described.

The Bishop of Rupert's Land thus describes the scene on the 24th May, when the flood was at its height:—

"My sister and I started for the Stone Fort at 6 A.M. It was necessary to see the Governor and Mrs. Mills on business connected with the continuance of the schools. Breakfasted with Major Caldwell in passing. Changed for a larger canoe at the Upper Fort, and proceeded onwards. Called at my own house, from which we were three canoes in convoy. As it turned out, ours was the only one which escaped damage from the current. The day was very fine, nearly as warm as the preceding. It was like delicious lake scenery at home, but for the want of background. What we here call hills, the Little and Stony Mountains, are but very gentle eminences of a few hundred feet, scarcely visible as heights, though all felt their value on this occasion. Strange sights met our eyes as we proceeded. Some of the bridges we saw four miles below their former locality, and on the opposite side of the river. The railing round some of the graves of the upper church had also been carried down as far. A barn had been tied to a strong tree to secure it, but it eventually floated off. The houses, many of them standing up to the eaves in water, showed less the destructive effects of the water upon them than some weeks after, when the waters had retired. At all the points where the trees had caught the drift wood, it was collected in great quantities, and upon it was a motley assemblage of wheels, hay-carts, tables, doors, chairs, &c.

"The delight was great to reach the first spot where the banks were visible, at Park's Creek, half way between the middle church and the Rapids. Here the current from being confined within narrower limits, became more impetuous, and we had been strongly advised to proceed by land ; but not being timid on the water, and having confidence in the skill of our three men, we preferred going on to the Rapids, merely stopping to pay one sad visit to the widow of our poor servant. . . . . At St. Andrew's we called to see Mr. and Mrs. Hunter, and from that drove our own horse down to the Lower Fort. This was the first drive we had had since the carioles were in use over the ice. Here we found a changed scene. . . . . Its chief recommendation (i.e. the Fort) in our eyes, under the circumstances was, that it still stood on a high bank, thirty feet above the river."

Various speculations have been advanced respecting the cause of the periodical floods of Red River. The backing up of the waters during a freshet in consequence of the ice on Lake Winnipeg remaining solid, is sufficiently disproved by the rapidity of current at the Lower or Stone Fort, which the Bishop states was "running at the rate of eight or ten miles an hour," thirty feet below the level of the prairie. The passage of the waters of the Missouri down the Valley of the Little Souris into the Assinniboine, has been a favourite theory among the half-breeds, one however which is not tenable, as the Little Souris does not approach the Missouri nearer than forty miles and no valley or coulée exists between them which would admit of the waters of the Missouri flowing across the Grand Coteau. It is probable that these periodical floods are caused by the sudden melting of an unusual fall of snow in the wooded areas on the east bank of Red River and throughout the large expanse of level open country, drained by Red River and the Assinniboine. The chief source of supply appears to be the valley of

Red River; the Assinniboine does not contribute largely to the flooding of the country; its waters indeed, are said to find their way to Lake Manitobah, down the valley of Rat Rivulet, during freshets, and the prairies at Pembina show, from the trunks of large trees scattered over them, that they were covered with water in 1852. Hence it appears that there is no possibility of guarding against these inundations, and that part of Red River Settlement above the Watermill Creek, subject to them, will always suffer from the disadvantages inseparable from such devastating occurrences.

APPENDIX

I. Table showing the lengths, distances from Lake Superior, heights, elevation above Lake Superior, and the number of the Portages on the Kaministiquia route.

II. A Statistical Account of Red River Colony, taken on the 20th to the 24th May 1856, compared with the Censuses of 1856 and 1843.

III. A Statistical View of the Church Missionary Society's Missions in North-Western America, May 1859.

IV. Stations of Missionaries in the Church Missionary Society's North-West American Missions, May 1859.

V. The Roman Catholic Missions west of Red River.

VI. The Wesleyan Missions.

VII. The Far West in the United States.

VIII. Season at Red River.

IX. Extract from a Journal kept at Fort à la Corne, on the main Saskatchewan, lat. 55·30, long. 104·25.

X. Prices of Furs at Fort Garry in January 1860.

XI. Additional Remarks on the Pigeon River Route, with an estimate of the cost of opening the Communication *viâ* Fort William, Arrow Lake, Gunflint Lake, Rainy Lake, and the North-West Corner of the Lake of the Woods to Fort Garry.

XII. Table of the Portages, Décharges, Rapids, Lakes, Lake Straits, and Navigable Channels on the Pigeon River Route (the old North-West Company's route) from Lake Superior to Rainy Lake, showing their lengths and distances from Lake Superior.

XIII. List of Photographs of Red River; the Churches of Selkirk Settlement; the Houses and Stores of the Settlers; Indian Tents and Graves; the Prairie; the Forts and Stores of the Hon. Hudson's Bay Company; the Native Races, and of the Expedition returning to Crow Wing in Dog Carioles. These Photographs can be procured from Mr. J. Hogarth, No. 5, Haymarket, London.

APPENDIX.

I.

Table *showing the lengths, distances from Lake Superior, heights, elevation above Lake Superior, and the number of the Portages on the Kaministiquia route.*

Names.	Lengths.	Distances from Lake Superior.	Heights.	Elevation above Lake Superior.	No. of Portages.	Remarks.
Kaministiquia River.	Mls. Chs.	Mls. Chs.	Feet.	Feet.		
Mouth (Fort William)	—	—	—	—	—	
Fort William	0 40	0 40	—	—	—	
Pointe des Meurons	9 40	10 0	4·49	4·49	—	
Rapids and Current	12 0	22 0	30·00	34·49	—	
Décharges des Paresseux	0 14	22 14	5·08	39·57	1	
Rapids and Current	7 4	29 18	16·63	56·20	—	
Mountain Portage (Kakabeka falls)	0 62	30 0	119·05	175·25	2	
River	0 20	30 20	—	175·25	—	
Rocky Portage (or Ecarté Portage)	0 37	30 57	62·65	237·90	3	
River	2 60	33 27	0·50	238·40	—	
Nicolet Portage	0 6	33 43	6·50	244·90	4	
Rapids and Current	1 37	35 0	5·75	250·65	—	
Portage	0 3	35 3	12·62	263·27	5	
River	0 37	35 40	—	263·27	—	
Pot Holes Portage	0 13	35 53	6·90	270·17	6	
River	0 22	35 75	—	270·17	—	
Couteau Portage	0 5	36 0	19·25	289·42	7	
Trois Décharges	0 35	36 35	10·00	299·42	8	
River	1 0	37 35	0·20	299·62	—	
Poplar Décharge	0 5	37 40	3·00	302·62	9	
River	0 40	39 0	0·50	303·12	—	
Décharge	0 9	39 9	3·00	306·12	10	
Rapids and Current	9 51	48 60	35·00	341·12	—	
Portage des Maitres	0 1	48 61	3·00	344·12	11	
River	0 60	49 41	1·00	345·12	—	
Little Dog Portage	0 3	49 44	14·94	360·06	12	
Rapids and Current	2 60	52 24	3·00	363·06	—	
Little Dog Lake	1 20	53 44	—	363·06	—	
Great Dog Portage	1 52	55 16	347·81	710·87	13	
Great Dog Lake.	10 60	65 76	—	710·87	—	
Dog River.						
Mouth	—	65 76	—	710·87	—	
River	30 0	95 76	3·00	713·87	—	
Barrière Portage	0 1	95 77	3·50	717·37	14	

Table showing the lengths and distances from Lake Superior, &c. (*continued.*)

Names.	Lengths.	Distances from Lake Superior.	Heights.	Elevation above Lake Superior.	No. of Portages.	Remarks.
Dog River—(continued).	Mls. Chs.	Mls. Chs.	Feet.	Feet.		
River	2 20	98 17	0·20	717·57	—	
Jourdain Portage . .	0 6	98 23	8·60	726·17	15	
River	0 40	98 63	—	726·17	—	
Prairie River.						
Mouth	—	98 63	—	725·17	—	
River	3 0	101 63	6·50	727·67	—	
Cold Water Portage . .	0 6	101 69	0·76	728·43	16	
Cold Water Lake . .	0 14	102 3	—	728·43	—	
Prairie Portage . . .	2 50	104 53	157·12	885·55	17	
Height of Land Lake . .	0 18	104 71	—	885·55	—	
De Milieu Portage . .	0 38	105 29	16·39	869·16	18	
Savanne Lake . . .	1 40	106 69	—	869·16	—	
Great Savanne Portage .	1 41	108 30	31·69	837·47	19	
Savanne River.						
Mouth	—	108 30	—	837·47	—	
River	13 20	121 50	4·79	832·68	—	
Thousand Lakes . . .	21 60	143 30	—	832·68	—	
Baril Portage . . .	0 17	143 47	1·86	834·54	20	
Baril Lake	8 0	151 47	—	834·54	—	
Brulé Portage . . .	0 21	151 68	47·02	787·52	21	
Upper Brulé Lake (or Cannibals Lake) . . .	8 0	159 68	1·50	786·02	—	
Semi-Décharge . . .	0 3	159 70	2·50	783·52	22	
Lower Brulé Lake . .	4 20	164 10	1·25	782·27	—	
Great French Portage . .	1 60	165 70	99·71	682·56	23	
French Portage Lake . .	1 40	167 30	—	682·56	—	
Pickerel River . . .	2 40	169 70	1·25	681·31	—	
Pickerel Lake . . .	13 0	182 70	—	681·31	—	
Pickerel Portage . . .	0 26	183 16	6·90	674·41	24	
Doré Lake	1 60	184 76	—	674·41	—	
Deux Rivières Portage .	0 32	185 28	117·22	557·19	25	
Sturgeon Lake . . .	23 20	208 48	1·00	556·19	—	
Sturgeon River.						
Mouth	—	208 48	—	556·19	—	
Semi-Décharge, 1st Sturgeon Rapids	0 11	208 59	4·51	551·68	26	
River	0 20	208 79	0·25	551·43	—	
Portage, 2nd Sturgeon Rapids	0 3	209 2	6·21	545·22	27	
Rapids and Current . .	7 8	216 10	10·00	535·22	—	
Semi-Décharge, Minnis Rapids	0 5	216 15	4·50	530·72	28	
Current	5 0	221 15	1·25	529·47	—	
Island Portage . . .	0 3	221 18	10·06	519·41	29	
River	4 0	225 18	2·00	517·41	—	
Nequawquon Lake (or Lac la Croix)	8 0	233 18	—	517·41	—	
Nameukan River.						
Mouth	—	233 18	—	517·41	—	
Current	2 0	235 18	5·00	512·41	—	

Table showing the lengths and distances from Lake Superior, &c. (*continued*).

Names.	Lengths.		Distances from Lake Superior.		Heights.	Elevation above Lake Superior.	No. of Portages.	Remarks.
NameaukanRiver—(continued).	Mls.	Chs.	Mls.	Chs.	Feet.	Feet.		
Rattlesnake Portage	0	5	235	23	12·14	500·27	30	
Current	3	27	238	50	1·75	498·52	—	
Crow Portage	0	8	238	58	9·88	488·64	31	
Rapids and Current	6	40	245	18	7·00	481·64	—	
Grand Falls Portage	0	6	245	24	16·08	465·56	32	
Current	0	3	248	24	3·00	462·56	—	
Grand Rapids	0	40	248	64	16·00	446·56	—	
River	2	40	251	24	2·00	444·56	—	
Lake Nameaukan	6	40	257	64	—	444·56	—	
Nu Portage	0	6	257	70	8·55	436·01	33	
Lakelet	0	20	258	16	—	436·01	—	
Portage	0	11	258	27	0·21	435·80	34	
River	5	0	263	27	0·50	435·30	—	
Rainy Lake	38	0	301	27	—	435·30	—	
Rainy River.								
Mouth	—		301	27	—	435·30	—	
Rapids	0	40	301	67	3·00	432·30	—	
Currents	1	40	303	27	0·50	431·80	—	
Fort Francis Portage	0	8	303	35	22·88	408·92	35	
River	32	60	336	15	10·00	398·92	—	
Manitou Rapids	0	15	336	30	2·50	396·42	—	
River	6	40	342	70	3·50	392·92	—	
Long Rapids	0	20	343	10	3·00	389·92	—	
River	38	0	381	10	12·10	377·82	—	
Lake of the Woods	72	0	453	10	—	377·82	—	
Winnipeg River.								
Rat Portage	0	13	453	23	15·98	361·84	36	
River	8	7	461	30	1·00	360·84	—	
Les Dalles Rapids	0	20	461	50	3·00	357·84	—	
River	25	0	486	50	2·00	355·84	—	
Grand Décharge	0	20	486	70	6·00	349·84	37	
River	2	0	488	70	2·25	347·59	—	
Terre Jaune Portage	0	5	488	75	22·02	325·57	38	
River	0	55	489	50	0·75	324·82	—	
Charette Décharge	0	2	489	52	3·50	321·32	39	
River	0	78	490	50	1·00	320·32	—	
Terre Blanche Portage	0	10	490	60	8·24	312·08	40	
River	0	28	491	8	0·15	311·93	—	
Cave Rapids	0	2	491	10	2·50	309·43	—	
River	19	0	510	10	4·50	304·93	—	
De l'Isle Portage	0	2	510	12	3·40	301·53	41	
River	22	78	533	10	4·00	297·53	—	
Chute à Jaques Portage	0	3	533	13	12·97	284·56	42	
River	9	57	542	70	1·60	282·96	—	
Point des Bois Portage	0	13	543	3	10·50	272·46	43	
River	0	7	543	10	0·25	272·21	—	
Point aux Chênes Portage	0	5	543	15	19·92	252·29	44	
River	0	75	544	10	1·00	251·29	—	
Roche Brulé Portage	0	3	544	13	7·80	243·49	45	

Table showing the lengths and distances from Lake Superior, &c. (continued).

Names.		Lengths.		Distances from Lake Superior.		Heights.	Elevation above Lake Superior.	No. of Portages.	Remarks.
		Mls.	Chs.	Mls.	Chs.	Feet.	Feet.		
Winnipeg River—(continued).									
River		4	37	548	50	1·75	241·74	—	
Slave Falls Portage . .		0	30	549	0	19·80	221·94	46	
River		6	10	555	10	2·25	219·69	—	
Barrier Falls Portage . .		0	2	555	12	4·97	214·72	47	
River		4	78	560	10	2·00	212·72	—	
Otter Falls		0	1	560	11	3·00	209·72	—	
Current		5	79	566	10	8·00	201·72	—	
The Seven Portages.	1st	0	4	566	14	10·23	191·49	48	
	Current . . .	0	16	566	30	1·00	190·49	—	
	2nd	0	3	566	33	8·47	182·02	49	
	Current . . .	0	37	566	70	2·00	180·02	—	
	3rd	0	5	566	75	5·60	174·42	50	
	Current . . .	1	15	568	10	2·25	172·17	—	
	4th	0	3	568	13	7·68	164·49	51	
	Current . . .	0	37	568	50	1·25	163·24	—	
	5th	0	2	568	52	2·90	160·34	52	
	Current . . .	0	38	569	10	2·00	158·34	—	
	6th	0	3	569	13	8·13	150·21	53	
	Current . . .	0	7	569	20	1·25	148·96	—	
	7th	0	3	569	23	4·75	144·21	54	
River		11	37	580	60	3·00	144·21	—	
Bonnet Lake . . .		4	40	585	20	—	144·21	—	
Bonnet Portage . . .		0	1	585	21	7·31	133·90	55	
River		0	59	586	0	2·00	131·90	—	
Cap de Bonnet Portage .		0	4	586	4	5·00	126·90	56	
River		3	16	589	20	3·25	123·65	—	
Big Bonnet Portage . .		0	50	589	70	34·23	89·42	57	
River		0	30	590	20	1·00	88·42	—	
Petit Roche Portage . .		0	13	590	33	8·25	80·17	58	
River		3	27	593	60	3·50	76·67	—	
White Mud Portage . .		0	15	593	75	13·05	63·62	59	
River		3	45	597	40	1·80	61·82	—	
Silver Falls Portage	1st	0	7	597	47	6·06	55·76	60	
	River	0	3	597	50	0·25	55·51	—	
	2nd	0	13	597	63	15·59	39·95	61	
River		5	47	603	30	1·40	38·55	—	
Pine Portage		0	12	603	42	8·03	30·20	62	
River		11	0	614	42	2·00	28·20	—	
Fort Alexander . . .		0	0	614	42	—	28·20	—	
Mouth of River . . .		1	60	616	22	—	28·20	—	
Winnipeg Lake . .		41	0	657	22	—	28·20	—	

II.

A Statistical Account of Red River Colony, taken on the 20th to the 24th May 1856, *compared with the Census of* 1856 *and* 1843.

Year.	Number of Families.	Religion.			Country.							Total.		
1856.	Average $6\frac{31}{1082}$ per family.	Episcopalian.	Presbyterian.	Catholic.	England.	Ireland.	Scotland.	Canada.	Norway.	Rupert's Land.	Switzerland.	Males.	Females.	Total.
1856 . .	1082	488	60	534	40	13	116	92	1	816	2	3225	3298	6523
1849 . .	1052	539	—	513	46	27	129	161	3	684	2	2714	2577	5291
Increase .	30	—	60	21	—	—	—	—	—	132	—	511	721	1232
Decrease	—	51	51	—	6	14	13	69	2	—	—	—	—	—
*1843 . .	870	2345		2798	22	5	110	152	—	571	2	—	—	5143

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* The census for this year, given above, is abstracted from the Journal of the Bishop of Montreal, published in 1845, Mr. Smith, the registrar, not having the census for the year 1843 in his possession.—H. Y. H.

A Statistical Account of Red River, &c.—(continued).

Year.	Dwellings.			Live Stock.								Implements.					Land.	Machinery.						Public Buildings.			
	Houses.	Stables.	Barns.	Horses.	Mares.	Oxen.	Bulls.	Cows.	Calves.	Pigs.	Sheep.	Ploughs.	Harrows.	Carts.	Canoes.	Boats.	Cultivated land at two bushels wheat per acre.	Wind Mills.	Water Mills.	Thrashing Mills.	Reaping Machines.	Winnowing Machines.	Carding Mill.	Churches.	Schools.	Shops, merchants, &c.	Gaol.
																	Acres.										
1856.	922	1232	399	1503	1296	2726	290	3593	2644	4674	2429	585	730	2045	522	55	8371	16	9	8	2	6	1	9	17	56	1
1849.	745	1066	335	1095	990	2097	155	2147	1615	1565	3096	492	576	1918	528	40	6392½	18	1	—	—	—	—	7	12	—	1
Increase	177	166	64	408	306	629	135	1446	1029	3109	—	93	154	1027	94	15	1978½	—	8	8	2	6	1	2	5	56	—
Decrease	—	—	—	—	—	—	—	—	—	—	667	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—
1843.	730	1291		821	749	—	107	2207	1580	1976	3569	—	—	—	—	—	—	18	1	—	—	—	—	—	—	—	—

COURTS.

Quarterly General Courts, 1855 and 1856.				Total.	Petty Local Courts, 1855 and 1856.																	Total amount of all the 38 cases of Petty Courts for one year.
					Petty Offences.						Debt.											
August.	November,	February.	May.	Number of Cases.	Trespass.	Cases of Damage or Misdemeanor.	Hay Ground Privilege.	Assault and Battery.	Defamation of Character.	Total number of cases.	From 1s. to 5s.	From 5s. to 10s.	From 10s to 20s.	From 20s. to 30s.	From 30s to 40s.	From 40s. to 50s.	From 50s. to 60s.	From 60s. to 70s.	From 80s to 90s.	From 90s. to 100s.	Total number of cases.	£ 46 s. 13 d. 6
No Cases.	No Cases.	One Case.	No Cases.	1	2	6	1	1	1	11	4	8	5	4	2	1	—	2	—	1	27	

III.

Statistical View of the Church Missionary Society's Missions in North-west America, May 1859.

MISSIONS.	NAMES OF DISTRICTS OR PRINCIPAL STATIONS.	FIRST COMMENCEMENT OF OPERATIONS.	NO. OF STATIONS.	CLERICAL AND LAY TEACHERS AND ASSISTANTS. CLERGYMEN. European. English.	Lutheran.	Native and Country-born.	LAY TEACHERS AND OTHERS. European. Male.	Female.	E. Indian & Country born. Male.	Female.	Native. Male.	Female.	TOTAL.	NATIVE COMMUNICANTS.	BAPTISMS DURING THE YEAR. Adults.	Children.	Adults or Children, but not specified.	TOTAL.	SEMINARIES AND SCHOOLS.	NATIVE SEMINARISTS AND SCHOLARS. Boys.	Girls.	Sexes not specified.	Youths and Adults.	TOTAL.
NORTH-WEST AMERICA.	Red River .	1822	4	5	—	1	2	—	1	—	10	—	19	413	No	Re	turns.		14	188	252	—	—	440
	Manitoba .	1842	3	1	—	1	—	—	—	—	3	—	5	41	—	—	13	13	1	33	17	—	—	50
	Cumberland	1840	2	1	—	1	—	—	1	—	4	—	7	138	—	22	—	22	3	25	21	44	—	90
	English River	1852	1	1	—	—	—	—	—	—	—	—	1	65	17	47	14	78	3	—	—	20	52	72
	York Fort .	1854	1	1	—	—	—	—	—	—	1	—	2	35	—	—	—	—	1	—	40	42	—	82
	James' Bay .	1851	1	2	—	—	—	—	1	—	2	—	5	84	—	—	39	39	1	—	—	25	—	25
	Fort Simpson	1857	1	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	1	—	—	200	50	250
	At Home.	—	—	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
	Total .		13	12	—	3	3	—	3	—	20	—	41	776	17	69	66	152	24	246	330	331	102	1009

IV.

STATIONS OF MISSIONARIES IN THE CHURCH MISSION SOCIETY.

NORTH-WEST AMERICA MISSION.—MAY 1859.

RED RIVER.

St. Andrew's	Ven. Archd. James Hunter, M.A., 1844.
	Rev. William West Kirkby, 1852.
	Rev. Edwin A. Watkins, 1852.
	Mr. Caleb Mayhew, 1856.
	1 European Schoolmaster.
La Prairie	Ven. Archd. W. Cockran, 1825.
Indian Settlement	Rev. Abraham Cowley, 1841.
Islington	Rev. Robert M'Donald, *Country-born.*

MANITOBA.

Fairford	Rev. William Stagg, 1853.
	Rev. James Settee, *Native.*
Fort Pelly	1 Native Teacher.

CUMBERLAND.

Cumberland	Rev. Henry George, 1854.
Moose Lake	1 Native Catechist.
Nepowewin	Rev. Henry Budd, *Native.*

ENGLISH RIVER.

English River	Rev. Robert Hunt, 1849.

YORK FACTORY.

York Factory	Rev. Joseph Phelps Gardiner, 1857.

JAMES' BAY.

Moose Fort	Rev. John Horden, 1851.
	Rev. Thomas H. Fleming, 1857.

PACIFIC.

Fort Simpson . Mr. William Duncan, 1856.

21 *Country-born and Native Teachers in addition to the above-mentioned.*

At Home . . . Rev. William Mason, 1840.

V.

THE ROMAN CATHOLIC MISSIONS WEST OF RED RIVER.

In 1830, Bishop Provencher went to Canada, with a view to induce his church to commence missionary operations in Rupert's Land, west of Red River, and returned the following year with his first missionary, Mr. G. Belcourt. This gentleman at once set himself to acquire the Salteaux dialect, as he was to begin with that tribe, being nearest at hand. He mastered the language thoroughly, and commenced operations above Lane's Fort, at a point which still bears his name. He baptized a number, and the mission got a good start under his management. Others followed him and laboured in hope, but after years of anxious care and toil, the results were not satisfactory. The death of Mr. Darveau, who succeeded Mr. Belcourt, and the better disposition of the Indians elsewhere, induced Bishop Provencher reluctantly to abandon that mission. At present there are no Catholic missions in, or immediately around the settlement: they are all in the interior. It is the universal experience of the missionaries, that the Indians in the immediate neighbourhood of white settlements are much more degraded and less disposed to spiritual matters, than those far from the whites. In 1842 the Roman Catholic missions fairly began. In that year M. Thibeault was sent forth, and was followed in 1844 by Messrs. Lafleche and Bourassa. And so they have increased until now they number sixteen or seventeen, and have five missionary stations.

Lake St. Anne Mission.—This place is known among *voyageurs* by the name of "Devil's Lake," which is a translation of the Indian name usually given in maps, Manitou Lake. It is nearly fifty miles west of Fort Edmonton, the head quarters of the Saskatchewan district. It was first visited by M. Thibeault in 1843, but was formally taken possession of only in the following year by Messrs. Lafleche and Bourassa. There are about forty houses, occupied partly by half-breeds, partly by Crees, Assinniboines, and Blackfeet. The present missionaries are—Rev. Fathers Lacombe, Remas, and Train. Making the St. Anne a sort of rendezvous, they have been through the whole Saskatchewan Valley, and have gone to the source of the Athabasca, to the Rocky Mountains, Red Deer Lake, and Ile-à-la-Crosse. The mission is provided with a chapel (now too small), a good house for the missionaries, a school, and a convent; which last, sisters of Charity will occupy this summer (1860).

Mission of Notre-Dame des Victoires.—The Red Deer Lake, on the border of which is this mission, is in the Saskatchewan district. There are some half-breeds at this mission, besides Crees and Chipewyans from Athabasca and Ile-à-la-Crosse. M. Thibeault visited it in 1845 and subsequently. Rev. Father Remas settled there in 1853. Its present missionaries are Rev. Fathers Maisonneuve and Vissot. The soil and climate permit the cultivation of wheat at this station. The missionaries go at times to Fort Pitt, but find little encouragement, as drunkenness prevails to a shameful extent, both among the Company's servants and the Indians.

St. John the Baptist Mission.—This is at Ile-à-la-Crosse, in the English River district. M. Thibeault first visited the spot in 1845, then in 1846; and in the fall of this year it was formally occupied by Rev. Father Tache and M. Lafleche. Monseigneur Grandin, coadjutor-elect of St. Boniface, and Rev. Father Vegreville, labour there at present among Crees and Chipewyans and the employés of the Company. They annually visit Lac

Vert and Portage à la Loche. There is a handsome church, a substantial house for the missionaries, and one ready for Sisters of Charity.

MISSION OF THE NATIVITY.—The Rev. Father Alex. Tache was the first missionary that visited Lake Athabasca, at the end of which this mission is situated. He went first in 1847, then in 1848. In the following year Father Faraud was permanently settled there. He understands the Cree and Chipewyan dialects perfectly, and is now assisted by Rev. Father Clut.

MISSION OF ST. JOSEPH.— It is on the Great Slave Lake. Rev. Father Faraud visited the place first in 1852, and subsequently in 1856; but it was permanently occupied only in 1858, when Rev. Fathers Grollier and Eynard took a position alongside of Fort Resolution. This is the furthest north of all the Roman Catholic missions. In 1858 Rev. Father Grollier went as far as Fort Simpson, the head quarters of the Mackenzie's River district.

The number of baptisms by the missionaries from the year 1842 to 1856 amounted to 5137. Since 1856 there have been no statistics received; they are furnished only at stated intervals. The revenue of the diocese of St. Boniface is not much over 2000*l.*—*Abbreviated from the Nor-Wester. May* 14*th*, 1860.

VI.

WESLEYAN METHODIST MISSIONS.*

NORWAY HOUSE.

Rev. Robert Brooking, of Rossville.

Number of Members, 164 in 1859.

"Our population is still rapidly on the increase. Since my last report was written there have been thirty baptisms and only five deaths, so that there has been an increase, by births over deaths, of twenty-five; and there has also been an addition by families coming in from other places. During the two years of my residence here the population has increased from all sources fully 100. Five marriages have been solemnized during the past year.

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* Thirty-fourth Annual Report of the Missionary Society of the Wesleyan Church in Canada, in connexion with the English Conference, Toronto, 1859.

"Several new houses were finished last fall, and there are six more now in frame, and the material got out for three or four others, which are to be raised when the boating is over. A larger quantity of ground is fenced in and under cultivation than has ever been before; so that if their prosperity does not keep pace with our wishes, yet we have every reason to thank God and take courage. In fact, there seems a general desire among our people to improve their circumstances."

OXFORD HOUSE.

Rev. Charles Stringfellow, of Jackson's Bay.

"As to the numbers in our Church there is a decrease of sixteen, being last year ninety-nine, the present year they number eighty-three. There are eighteen persons on trial for membership in addition to the eighty-three members. Of this decrease ten have removed to hunting-grounds contiguous to Rossville Mission, and therefore will augment by ten the numbers there in society. Five other persons, four male and one female, have died during the year."

EDMONTON AND ROCKY MOUNTAINS.

Rev. Thos. Wolsey.

VII.

THE FAR WEST IN THE UNITED STATES.

From its mouth to the Great Bend, the Missouri admits of almost continuous settlement on its *immediate* banks; thence, to Fort Union, only about one-fourth could be cultivated; and above Fort Union many extensive but detached bottoms show their adaptation for small independent agricultural areas.

The general westward progress of settlement a few miles west of the Upper Missouri River, is rendered impossible by the conditions of climate and soil which prevail there. The progress of settlement must necessarily be up the Valley of the Mississippi, on the immediate banks of the Missouri, and through the Valley of the Red River of the north, to the cultivable areas in the basin of Lake Winnipeg. The exploration for the Pacific Railroad and the meteorological investigations carried on under the direction of the Surgeon-General of the U. S. army, show conclusively that no settlement of any importance can be established over a vast extent of country, many hundred miles broad, on the eastern flank of the Rocky Mountains, and south of the Great Bend of the Missouri. Owing to the absence of rain, the apparently great rivers, the Platte, the Canadian, the Arkansas, &c., are often converted into long detached reaches or ponds during the summer months, and forbid extensive settlements even on their immediate banks. This great and important physical fact is contrary to popular opinion, which is mainly based upon an inspection of a map, and guided by the glowing but utterly erroneous descriptions which are periodically circulated respecting the wonderful fertility of the Far West, and its capability of sustaining a dense population.

The arid districts of the Upper Missouri are barren tracts, wholly uncultivable, from various causes.* The arid plains between the Platte and Canadian rivers are in great part sand-deserts. The "Sage-plains," or dry districts, with little vegetable growth except varieties of Artemisia, begin on the western border of the plains of the eastern Rocky Mountain slope, and cover much the larger portion of the whole country westward.† The sterile region on the eastern slope of the Rocky Mountains begins about 500 or 600 miles west of the Mississippi, and its breadth varies from 200 to 400 miles; and it is then succeeded by the Rocky Mountain range, which, rising from an altitude of 5200 in feet lat. 32°, reaches 10,000 feet in lat. 38°, and declines to 7490 feet in lat. 42° 24′, and about 6000 in lat. 47°. Along this range isolated peaks and ridges rise into the limits of perpetual snow, in some instances attaining an elevation of 17,000 feet. The breadth of the Rocky Mountain range varies from 500 to 900 miles. The soil of the greater part of the sterile region is necessarily so from its composition, and where well constituted for fertility, from the absence of rain at certain seasons. The general character of extreme sterility likewise belongs to the country embraced in the mountain region.* The table subjoined is capable of conveying a very good idea of the great barrier to the westward progress of settlement, which lies between the Mississippi Valley and the Pacific slope of the Rocky Mountains. It is extracted from a table showing the lengths, sums of ascents and descents, &c. &c., of the several routes surveyed for a railroad from the Mississippi to the Pacific, and published in the "Exploration and Surveys," before quoted.

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* Page 684, Army Meteorological Register, U. S.

† Ibid.

	Length of Railway.	No. of miles of route through arable land.	No. of miles of route through lands generally uncultivable, arable soil being found in small areas.	No. of sq. miles of sums of areas of largest bodies of arable land in uncultivable regions.
	Miles.			
Route near 47th & 49th parallel .	1864	374	1490	1000
,, ,, 41st & 42nd ,, .	2032	632	1400	1100
,, ,, 38th & 39th ,, .	2080	620	1460	1100
,, ,, 35th ,, .	1892	416	1476	2300
,, ,, 32nd ,, .	1618	408	1210	2300

This table shows that the least distance of uncultivable land through which a railway from the Mississippi to the Pacific must pass, in the United States territory, exceeds 1200 miles in length,—a barrier sufficient to arrest the general progress of settlement, for very many years to come, in a course due west of the Mississippi.

The only direction which remains for extensive free soil settlement in and near the United States is northwards, partially along the immediate banks of the Missouri, about the headwaters of the Mississippi, and towards the valleys of the Red River and the Assinniboine and the main Saskatchewan. The popular impression that immense areas of land, available for the purposes of agriculture, lie between the Missouri and the Rocky Mountain chain, has, as before stated, been completely refuted by the explorations and surveys for the Pacific Railroad. The now well ascertained aridity of climate and its natural consequence, sterility of soil, both combine to confirm the title of "The Great American Desert," given by the early explorers of the eastern flank of the Rocky Mountains to that extensive region of country. This important fact cannot fail to exercise a powerful influence upon the occupation of British territory north of the 49th parallel of latitude, and on the sources from which that occupation will flow. [From a paper by the author on the Great North-West, published in 1858.]

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* Exploration and Surveys for a Railroad Route from the Mississippi River to the Pacific Ocean, page 40.

VIII.

SEASONS AT RED RIVER.

ON THE PROGRESS OF THE SEASONS AND STATE OF THE WEATHER AT RED RIVER SETTLEMENT, FROM 1ST JUNE, 1855, TO 31ST MAY, 1856.

1855. June 5th was the coldest day in the month. Thermometer, 7 a. m., 58; 2 p. m., 63; 9 p. m., 56. The 14th was the hottest day. Thermometer, 7 a. m., 72; 2 p. m., 88; 9 p. m., 71. Three inches of rain fell on the 17th, one on the 19th and six on the 25th.

July 2nd was the coldest. Thermometer, 7 a. m., 56; 2 p. m., 78; 9 p. m., 68; light rain. The 25th was the hottest day. 7 a. m., 87; 2 p. m., 92; 9 p. m., 82. 7th, rain $3\frac{3}{8}$ inches; 10th, rain $\frac{3}{4}$ inches. Thunderstorm on the 17th, rain 3 inches. 26th, 1 inch rain; 29th, 3 inches rain; 30th, 2 inches; total $14\frac{5}{8}$ inches. Wheat out of the ear. On the 12th hay-cutting commenced. Tabani and mosquitoes very numerous and troublesome.

August: — Coldest day, 29th. Thermometer, 7 a.m., 44; 1 p.m., 68; 9 p.m., 56. The hottest day was the 5th. 7 a.m., 67; 2 p.m., 86; 9 p.m., 76. On the 8th, 5 inches of rain fell; 11th, 5¼ inches fell; 14th, 2 inches; 27th, ¼ inch: total, 12½ inches. Barley harvest commenced about the 1st; wheat harvest on the 15th. Slight frost on the 30th.

September:—The coldest day was the 30th. Thermometer average + 48. The hottest day was the 5th; thermometer, 7 a.m., 70; 2 p.m., 80; 9 p.m., 70. Total of rain during the month, 6½ inches. Finished storing wheat on the 8th. A few leaves falling. 26th, grey geese flying to the south.

October: — The warmest day was the 1st. Thermometer, 7 a.m., 56; 2 p.m., 70; 9 p.m., 58. Some snow fell on the 4th. Taking up potatoes on the 8th. White geese flying to the south, and continued to do so up to the 20th, and a few flocks later than that: all the larger kind of ducks leave about the same time. The deciduous trees are bare of leaves, except the oak, and some of the hardier kinds.

November:—The 2nd was the warmest day. Thermometer, 7 a.m., 32; 2 p.m., 38; 9 p.m., 36; 2½ inches rain fell on the 3rd; 5 inches of snow fell on the 11th; 12th, river covered over with ice. The coldest day of the month was the 21st, thermometer, 7 a.m., —12; 2 p.m., +8; 9 p.m. +6. Warm weather from the 21st to the end of the month. Seven inches of snow fell during the month. Flocks of snow birds have made their appearance from the north, and all the summer birds are gone.

December:—The warmest day was the 6th. Thermometer, 7 a.m., +22; 2 p.m., +26; 9 p.m., +30. The coldest day was the 24th; thermometer, 7 a.m., —48; 2 p.m., —30; 9 p.m., —40. We had six days of very cold weather, including the 23rd and 28th. The wind blew from the north during three days before the severe cold began; during its continuance there was very little wind, and for two of the coldest days it was at the south. Eight inches of snow fell.

1856, January:—The warmest day was the 17th. Thermometer, 7 a.m., +10; 2 p.m., +22; 9 p.m., +16. The coldest was the 7th; thermometer, 7 a.m., —36; 2 p.m.—28; 9 p.m., —36. Five inches of snow fell. The average cold for this month has not been great; very little wind.

February:—Coldest day the 2nd. Thermometer, 7 a.m., —36; 2 p.m., —20; 9 p.m., —34. The warmest day was the 20th; thermometer, 7 a.m., +26; 2 p.m., +35; 9 p. m., +24. 6 inches of snow fell. After the 12th, spirits of wine in the glass stood with few exceptions above zero, and the weather has been pleasant.

March:—The coldest day was the 8th; 7 a.m., —32; 2 p.m., 24; 9 p.m., —26. The warmest day was on the 22nd. Thermometer, 7 a.m., +28; 2 p.m., +38; 9 p.m., +34. The thermometer fell during the night a few degrees below zero; but on the whole the weather was pleasant; 6½ inches of snow fell. Much of the snow melted during the month. Barking crows made their appearance about the 20th.

April:—Geese made their appearance on the 2nd, and the snow birds left us for the north. The 12th was the coldest day this month. Thermometer, 7 a.m., +16; 2 p.m., +30; 9 p.m., +24. Warmest day, 23rd: thermometer, 7 a.m., +46; 2 p.m., +66; 9 p.m, +44. About six inches of snow, and five of rain fell. On the 16th the rain began to throw off its winter coat; clear of ice on the 20th. Sturgeon taken in the river in great numbers; the snow all away. Wild fowl to be seen in every direction on the 29th, and sowing wheat commenced.

May:—The coldest day, 11th. Thermometer, 7 a.m., +34; 2 p.m., +43; 9 p.m., +30. The warmest day was the 18th, 7 a.m., +75; 2 p.m., +84; 9 p.m., +56; four inches rain fell on the 26th. On the 4th whip-poor-will began his serenades. The wheat sown on the 29th has germinated, and given a green appearance to the field. On the 9th wild geese abundant in the plains; maple in leaf, gooseberry bushes the same; finished sowing wheat on the 10th.

1856. Wheat sown in the beginning of May, was in the ear on the 13th July, and ripe on the 20th August. The wheat sown on the 29th April was ripe on the 14th August. The hottest day this last summer was the 20th of July. Barley harvest commenced in July; finished cutting wheat on the 28th August; slight frost on the 30th of the same month; potatoes taken up first week of October.

6th September:—Flocks of grey geese flying to the south. *Prunus Americana* ripe and very plentiful in the first part of this month, or rather before this month. Flocks of passenger pigeons are in from the north, and leave from the 20th to the last of the month. On the night of the 7th whip-poor-will gave us his parting song. *Coregonus lucidus* enter the river to spawn. The *Coregonus albus* in Lake Winnipeg commences spawning about the 19th of October, and ends about the 1st November.

This Register was kept by Mr. Donald Gunn, of the Lower Settlement, Red River. For the details of the Register see the Red River Report for 1857.

IX.

Extracts from a Journal kept at "Fort à la Corne," on the Main Saskatchewan, Lat. 55°·30, *Long.* 104°·25.

1856.

April 1.—No frost last night, but thick mist this morning. The weather has been warm although cloudy.

2.—Hard frost last night, but mild during the day.

4.—Slight frost last night, day very mild. Snow dissolved a great deal during the day. Water making its appearance on edge of river.

7.—Froze hard last night, and has been cold most of the day.

8.— Do. do. no thaw during the day. River rising very much, and boat frozen in.

9.—Ice made a start previous to moving.

17.—Warm weather, ice drifting down river.

April 19.—Weather fine. Annual Goose Dance of McLeod took place to-day.

21.—Rain with N. W. wind.

23.—Had good fall of snow during night. Continued snowing without intermission the whole day. Nets set for first time. One sturgeon, ten suckers, and one gold-eye caught.

25.—Hard frost last night.

26.—Weather fine, considerable quantity of ice in river, but melting fast.

May 1.—Weather warm. Change perceived on trees, they are getting a little *green.*

2.—Working in garden; put down peas, onions, radish, and a few greens. Net produced two sturgeon.

6.—Weather warm.

10.—Storm of snow and rain during last night, with a strong north wind, which continued at intervals during the day.

12.—Planted north field with potatoes, and ploughed south field.

13.—Cloudy, rain, with N. W. wind. Planted potatoes in south garden.

14.—Cold north wind. Sowed four beds of Swedish turnips.

21.—Thunder and lightning most of last night. Rain poured down in torrents. River rose considerably to-day.

30.—Saskatchewan Brigade arrived this afternoon. Started same evening.

June 1.—Clear and beautiful to-day.

Sept. 16.—Raining all day, wind east.

17.—Clear but rather cold. Slight frost last night. Wind N. E. (light).

20.—Mild and warm during day. Slight frost last night.

Oct. 2.—Raining all morning; wind W. Cleared up in the afternoon. Men in morning cleared all the *potato* stalks out of north garden, and in afternoon commenced again the potatoes in south garden.

Oct. 13.—S. W. wind. Fall boats started this morning for Carlton.

17.—Fine weather, men employed in garden.

18.—Do. do. putting dung in garden.

22.—Very hard frost over night.

23.—Severe frost last night.

26.—Snowed during night, but thawed as it fell. Blowing very hard.

Nov. 11.—River full of ice.

16.—Weather fine. One cow calved.

31.—Slight fall of snow last night, but day remarkably fine.

Dec. 1.—Weather fine, not in the least cold. Have had no cold weather as yet, compared to last year.

2.—Weather colder than of late.

5.—Slight fall of snow during night.

11.—Very cold.

12.—Cold, very severe.

31.—Snowing most of the day.

1857.

Jan. 2.—Cold, and snowing at intervals.

3.—Very cold.

Mar. 29.—Hard frost last night.

30.—Very warm, snow melting about the fort.

31.—Raining during the night. Slight rain during the day.

April 2.—North wind and cold. No thaw these three days back.

3.—North wind and very cold.

4.—North wind.

5.—Weather milder, a slight thaw.

6.—South wind, thawing a great deal.

8.—Hard frost last night, cold all day. North-west wind accompanied with snow, which continued most of the day.

April 9.—Snowed last night. Cold during day. Water appearing on edges of river.

At this time last year ice started in river. What a difference this year ! We cannot go anywhere at present without snow-shoes, our cattle are nearly starved, they cannot go about as the snow is so hard.

10.—Weather still cold, wind variable.

11.—Storm of snow and wind.

12.—Hard frost last night. Cold all day. No thaw.

13.—Blowing hard, accompanied with snow. Day fine and snow dissolving. Turned very stormy in afternoon. North wind with snow.

14.—Still cold. North wind. No thaw.

15.—Southerly wind, but still cold. River still rising at edges. Little or no thaw during day.

16.—Weather clear, but still cold. Little or no thaw. Notwithstanding the late cold weather the ice went off this day.

17.—Weather same. Very little ice drifting down river.

18.—Weather still cold. North wind.

19.—Fine during day. Sun shining bright. Snow melted a good deal.

20.—Day fine, but weather turned cold towards evening. Had a slight fall of snow last night.

21.—Beautiful day. Snow dissolving fast. Little or no ice drifting.

22.—Cloudy and variable, very little thaw.

23.—Strong south wind. Thawing very much.

24.—Snowed without intermission the whole day. Wind variable, and blowing hard.

25.—Beautiful day. Warmest we have had this season.

27.—Cloudy and cold, with slight snow.

28.—Weather fine and warm.

29.—Cold and cloudy. Slight snow.

30.—Beautiful day, but blowing hard.

May 1.—Weather and wind from same quarter. Snow dissolving fast.

3.—Ice drifting all last night, but not much to-day.

5.—Disagreeable day. Snowing without intermission, with a cold north wind. River full of ice.

8.—Stormy northerly wind, and very cold.

12.—Weather warm. Yesterday planted potatoes and onions in south garden, and to-day sowed cabbages in boxes.

15.—Mild, wind south.

18.—Boisterous weather.

20.—Beautiful day. All hands employed planting potatoes. Sowed turnips, carrots, beans, &c. Nets caught three sturgeon and nine suckers.

21.—Very warm. Annual Goose Dance came off.

June 2.—Hard frost last night. Froze my beans, and the hops were affected also.

7.—Rained hard all last night, and continued without intermission all day.

9.—Fine weather, river still rising.

15.—Very warm and clear this afternoon.

30.—Beautiful day. Bull dogs so numerous that horses had to be put in stable, and grass cut for them. Starvation is staring the people in the face. Have caught no sturgeon for some time back. Our nets produced nothing to-day.

1858.

April 20.—Warm and clear, south wind.

21.—Ice drifting in river. Large quantity of ice on banks.

22.—Cold north wind.

24.—Slight fall of snow in morning. Rain towards sunset. Still cold, wind south-west.

25.—Warm and fine to-day.

27.—South wind. Warmest day this spring.

April 28.—North wind. Cold and blowing hard.

May 1.—South wind. Warm. Sky overcast with smoke. Large fire close to fort. Clearing up north garden.

7.—Set four men to dig potatoe ground in south garden. Caught one sturgeon, first this spring.

11.—Cold north wind. Cut the potatoes for planting.

12.—Planted potatoes in south field and commenced to dig the north field for sowing. Sowed beetroot, radish, and lettuce.

15.—South wind. Weather cold. Planted north garden with potatoes.

17.—Still cold. Slight fall of snow in night.

18.—Wind from north, and cold. Think we are going to have a second winter.

19.—Continues cold. Wind north.

20.—Weather improving, wind south-west.

21.—Warm and mild. South wind.

22.—Warm and fine.

23.—Warm in morning. Thunder and rain towards sunset.

24.—Warm. Wind south. Clearing up garden. River muddy and water rising fast.

June 1.—Wind south, and weather warm.

8.—Wind north, and appearance of cold. Think we are going to have a cold summer. Garden herbs slow in making their appearance above ground.

15.—Weather continues warm.

July 1.—Boisterous weather. Wind north.

10.—Very warm to-day. Bull dogs so numerous, horses and cattle had to be kept in stable all day. Man hoeing south garden.

21.—A very fine day.

X.

PRICES OF FURS AT FORT GARRY IN JANUARY, 1860 :—

Badgers	1s. 0d.
Beavers (large)	3s. 6d.
Bears (black)	£1 10s. to £2 0s. 0d.
Fishes	10s. 0d.
Foxes (silver)	£6 0s. 0d.
Do. (cross)	15s. 0s. to £1 0s. 0d.
Do. (red)	4s. 0d.
Lynx (large)	4s. 0d.
Martens	8s. to 10s. 0d.
Minks	3s. 0d.
Otters	10s. to 12s. 0d.
Racoon	2s. 0d.
Buffalo skins (dressed)	8s. to 10s. 0d.
Moose skins (dressed)	12s. to 15s. 0d.
Wolves	3s. 6d.
Rats	1d.

XI.

REMARKS ON THE PIGEON RIVER ROUTE, WITH AN ESTIMATE OF THE COST OF OPENING IT FOR COMMERCIAL TRAFFIC. BY J. A. DICKINSON, C. E.*

SIR,

* * * * * * *

On looking at the profile of this route (see profile of the Pigeon River Route, plate of sections), one is struck by its similarity to the profile of an artificial canal; for with the exception of the Pigeon River and the Nameaukan, this route consists of a close chain of lakes, only requiring locks to form a canal sufficient for boats or steamers as large as will ever be needed for carrying the traffic of the country. It will be shown hereafter how the Pigeon River can be avoided, and the Nameaukan presents no difficulties that cannot be easily overcome.

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* Reports of Progress, &c. Assinniboine and Saskatchewan Exploring Expedition. Chap. xxi. page 201. Blue Book — presented Aug. 1860.

The profile of the Kaministiquia and Rivière la Seine route shows that out of a length of 240 miles, there is only about ninety-five miles of lake navigation; the remaining 145 miles consists of rivers of various velocities. Now the advantages of lakes over rivers for the purposes of navigation are many and important: 1st, the absence of currents in lakes, which in rivers impede the upward navigation more than they assist the downward. 2ndly, lakes are not subject to the great and sudden changes of level which occur in most rivers. 3rdly, a high flood in a lake would be of no consequence, whereas in a river it might be dangerous and full of difficulties. 4thly, long and straight courses may be obtained on lakes, and the steering of craft is consequently easy; but on rivers, owing to their windings and eddies, steering is troublesome and difficult.

These are some of the reasons for my preferring the route by the lakes to the Kaministiquia and Rivière la Seine route; the others being that it is shorter by several miles, that the portages on it are better, and lastly, that it passes through a country bearing superior timber. This for a long period of years was the route traveled by the old voyageurs, and was only given up, I understand, on account of the length of the Grand Portage, which was supposed to have had a bad effect on the spirits of the men, occurring as it did at the commencement of their journey. I may remark, in confirmation of this opinion, that our guide, who was with us on both routes, and who had made some forty journeys between Lake Superior and Red River, said he much preferred the Pigeon River route to any other, and how could there be a person better qualified for being a judge than he?

The lakes on the Pigeon River route are all deep, free from shoals and rocks, wide, and yet not so wide as to be affected by winds. The works necessary for the improvements of either of these routes are of course of the same character, but for the same reasons that make the Pigeon River route preferable to the other even now, the works on it could be more easily executed; they would cost less and be more permanent. A dam placed across a river is always liable to be more or less damaged by freshets, and most of those on the Rivièrè la Seine route would, moreover, I think, flood a great portion of the country; whereas dams built at the head of the streams issuing from the lakes, would not have to bear any extraordinary force arising from a sudden rush of water, and would therefore be more stable. The portages on the Pigeon River route being better than those on the other, will, of course, cost less for improvements; and if hereafter locks were to be made where the portages are now, the lakes will afford a much surer and more abundant supply of water for them than the rivers. The means that might be adopted for making this Pigeon River route sufficient for any purposes that are likely to be required at present or for some time to come, are the following:—

The repairing, or perhaps remaking, of the old North-West Company's road from Point des Meurons, near Fort William, to Arrow Lake. This road is only about forty-five miles long, and has been reported favourably on by a member of the Red River expedition, who examined it in the year 1857. The difficulties that there would be in improving the portion of the route between Lake Superior and the Height of Land, in any way compel the necessity of this road being made use of. Arrow Lake will then be the commencement of the water communication. Boats capable of carrying five tons, such as are at present used by the Hudson's Bay Company, to be employed on the lakes as far as Rainy Lake. In order to avoid the unloading and re-loading of the boats at the portages, iron tramways might be laid down at these places, by which the loaded boat might be carried from one lake to another, and thus save a great deal of time and trouble. Some of the present portages might be got rid of with little expense, by clearing out the passage between two lakes, and placing a dam so that the water in the lower lake would rise to the level of the upper one, and so deepen the connecting channel and get rid of the rapid or fall in it. This could be done in several cases. On Rainy Lake a steamer might be placed, one of the ordinary lake steamers, which could go as far as Fort Frances on Rainy River. Here, on account of the falls, a transhipment must be made to another steamer, which can ply the whole way between the falls and the north-west corner of the Lake of the Wood. From this point a road to be made across to the Red River Settlement. This road would not be more than 100 miles long, the greater part of it, seventy miles at least, would, I know from my own knowledge (see my Report, No. VII.), be made without any difficulty.

The following is a rough estimate of the cost of these several works:—

	£
Road from Point des Meurons (Fort William) to Arrow Lake	1,000
Tramways over the portages	5,000
Dams	2,000
Road from the Lake of the Woods to Red River . .	1,500
Depôts	500
Engineering and contingencies	1,500
	11,500

I think it is quite safe to say that the expenses for making the improvements I have suggested would be considerably under 12,000*l.* sterling.

The length of the proposed route, and the time it will take to perform the journey, will be—

	Length.	Hours.
Carriage Roads	145	36
Tramways	3	6
Boat navigation	156	39
Steam navigation	186	18
Total	490	99

Allowing a rest of eight hours in the twenty-four, the journey may easily be accomplished in less than six days. Mr. Dawson has stated that it will take but "three days, as near as may be," to accomplish the journey by the other route; but it appears he takes no thought of the necessary delays at the portages, or of the rest necessary both for the travelers and the boatmen, and he proposes to run at night on unlighted and intricate waters. The journey might no doubt be made in five days, if necessary, by the route I propose; but allowing for accidents and delays, I think it better to calculate on its taking six.

In conclusion, I would say, that before works of any magnitude are undertaken for the opening out of a communication between Lake Superior and Red River, it would be advisable that a more accurate survey than has as yet been taken should be made of the whole country.

Yours truly,
James Austen Dickinson.

H. Y. Hind, Esq.
&c. &c.

XII.

Table of the Portages, Décharges, Rapids, Lakes, Lake Straits, and Navigable Channels on the Pigeon River Route (the old North-West Company's Route) from Lake Superior to Rainy Lake, showing their Lengths and Distance from Lake Superior.[*]

Portages.		Décharges.		Rapids.		Lakes.		Lake Straits and Navigable Channels.		Distance from Lake Superior.	Remarks.
	Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.	Statute miles.	
No. 1. Grand Portage	8·16									0·00	
								No. 1. Pigeon R.	1·50	8·16	
2. Partridge Portage	0·25									9·66	
								2. Pigeon R.	4·25	9·91	Strong current. Canoes poled up part of the way.
		No. 1. Décharge	0·25							14·16	
								3. Pigeon R.	1·75	14·41	
		2. Décharge	0·35							16·16	
								4. Pigeon R.	3·13	16·51	
3. Fowl Portage	1·13									19·64	
						No. 1. Fowl Lake	4·55			20·77	
4. Mosse Portage	0·41									25·32	
						2. Mosse Lake	4·25			25·73	
5. Great Cherry Por.	0·48									29·98	
						3. Lake	0·25			30·46	
6. Mud Portage	0·15									30·71	
						4. Lake	0·30			30·86	

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[*] The distances are from the International Boundary Survey—made according to the 7th article of the Treaty of Ghent.

Table of Portage, &c.—(continued).

Portages.		Décharge.		Rapids.		Lakes.		Lake Straits and Navigable Channels.		Distance from Lake Superior.	Remarks.
	Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.	Statute miles.	
No. 7. Lesser Cherry P.	0·13	. .	. .	. .	. .	. . .	. .	. . .	.	31·16	
						No. 5. Mountain L.	7·81	. . .	.	31·29	
8. Watap Portage .	0 30	. .	. .	. .	. .	. . .	. .	. . .	.	39·10	
						6. Watap Lake.	3·70	. . .	.	39·40	
9. Great New Port.	1·46	. .	. .	. .	. .	. . .	. .	. . .	.	43·10	
						7. Rose Lake .	3·00	. . .	.	44·56	
10. Portage . .	0·01	. .	. .	. .	. .	. . .	. .	. . .	.	47·56	4 feet fall.
						8. Mud Lake .	2·62	. . .	.	47·57	
11. Portage . .	0·21	. .	. .	. .	. .	. . .	. .	. . .	.	50·19	
						9. South Lake .	2·84	. . .	.	50·40	
12. Height of Land P.	0·26	. .	. .	. .	. .	. . .	. .	. . .	.	53·24	
						10. Gun Flint L.E.	2·77	. . .	.	53·50	
		No. 3. Décharge	0·01	. .	. .	. . .	. .	. . .	.	56·27	4 feet fall.
						11. Gun Flint L.W.	8·92	. . .	.	56·28	
				No. 1. Rapid	0·01	. . .	. .	. . .	.	65·20	2 ft. fall. North canoes let down by line.
								No. 5. Lake Strait	0·25	65·21	
13. Little Rock Port.	0·02	. .	. .	. .	. .	. . .	. .	. . .	.	65·46	
								6. Lake Strait	0·75	65·48	
				2. Rapid	0·01	. . .	. .	. . .	.	66·23	
								7. Lake Strait	0·25	66·24	

XIII.

*Table of the Portages, Décharges, Rapids, Lakes, Lake Straits and Navigable Channels on the Pigeon River Route (the old North-West Company's Route) from Lake Superior to Rainy Lake, showing their Lengths and Distance from Lake Superior.**

Portages.		Décharges.		Rapids.		Lakes.		Lake Straits and Navigable Channels.		Distance from Lake Superior.	Remarks.
	Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.	Statute miles.	
No. 1. Grand Portage	8·16									0·00	
								No. 1. Pigeon R.	1.50	8·16	
2. Partridge Portage.	0·25									9·66	
								2. Pigeon R.	4·25	9·91	Strong current. Canoes poled up part of the way.
		No. 1. Décharge	0·25							14·16	
								3. Pigeon R.	1·75	14·41	
		2. Décharge	0·35							16·16	
								4. Pigeon R.	3·13	16·51	
3. Fowl Portage	1·13									19·64	
						No. 1. Fowl Lake.	4·55			20·77	
4. Moose Portage	0·41									25·32	
						2. Moose Lake.	4·25			25·73	
5. Great Cherry Por.	0·48									29·98	
						3. Lake	0·25			30·46	
6. Mud Portage	0·15									30·71	
						4. Lake	0·30			30.86	
7. Lesser Cherry P.	0·13									31·16	
						5. Mountain L.	7·81			31·29	

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* The distances are from the International Boundary Survey—made according to the 7th article of the Treaty of Ghent.

Table of Portages, &c.—(continued).

Portages.		Décharge.		Rapids.		Lakes.		Lake Straits and Navigable Channels.		Distance from Lake Superior.	Remarks.
	Length in St. miles.		Length in St. Miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.	Statute miles.	
No. 8. Watap Portage .	0·30	. .	. .	. .	. .	. . .	. .	. . .	.	39·10	
						No. 6. Watap Lake	3·70	. . .	.	39·40	
9. Great New Por. .	1·46	. .	.	. .	. .	. . .	. .	. . .	.	43·10	
						7. Rose Lake.	3·00	. . .	.	44·56	
10. Portage . .	0·01	. .	. .	. .	. .	. . .	. .	. . .	.	47·56	4 feet fall.
						8. Mud Lake.	2·62	. . .	.	47·57	
11. Portage . .	0·21	. .	. .	. .	. .	. . .	. .	. . .	.	50·19	
						9. South Lake	2·84	. . .	.	50·40	
12. Height of Land P.	0·26	. .	. .	. .	. .	. . .	. .	. . .	.	53·24	
						10. Gun-Flint L.E.	2·77	. . .	.	53·50	
		No. 3. Décharge	0·01	. .	. .	. . .	. .	. . .	.	56·27	4 feet fall.
						11. Gun-Flint L.W.	8·92	. . .	.	56·28	
				No. 1. Rapid	0.01	. . .	. .	. . .	.	65·20	2 ft. fall. North canoes let down by line
								No. 5. Lake Str.	0·25	65·21	
13. Little Rock Por.	0·02	. .	. .	. .	. .	. . .	. .	. . .	.	65·46	
								6. Lake Str.	0·75	65·48	
				2. Rapid	0·01	. . .	. .	. . .	.	66·23	
								7. Lake Str.	0·25	66·24	
14. Mill-Fall Portage	0·06	. .	. .	. .	. .	. . .	. .	. . .	.	66·49	
								8. Lake Str.	0·25	66·55	
15. Island Portage .	0·29	. .	. .	. .	. .	. . .	. .	. . .	.	66·80	
						12. Lake .	1·35	. . .	.	67·09	
						. . .	. .	. . .	.	68·44	3 ft. fall, 2 ft. deep. North canoes let down by line.
				3. Rapid	0·02	13. Lake .	0.85	. . .	.	68·46	

Table of Portages, &c.—(continued).

Portages.		Décharge.		Rapids.		Lakes.		Lake Straits and Navigable Channels		Distance from Lake Superior.	Remarks.
	Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.	Statute miles.	
				No. 4. Rapid	0·07	. . .	. .	. . .	0.75	69·31	5 ft. fall, 2 chs. wide. North canoes let down by line.
								No. 9. Lake Str.	.	69·38	
				5. Rapid	0·05	. . .	. .	. . .	0·50	70·13	4 ft. fall, 25 ft. wide. North canoes let down by line
								10. Lake Str.	.	70·18	
				6. Rapid	0·04	. . .	. .	. . .	0·12	70·68	3 ft. fall. North canoes let down by line.
								11. Lake Str.	.	70·72	
				7. Rapid	0·01	. . .	. .	. . .	0·20	70·84	1 ft. fall. Run by loaded North canoes.
								12. Lake Str.	.	70·85	
				8. Rapid	0·01	. . .	. .	. . .	0·45	71·05	1 ft. fall. Run by loaded North canoes.
								13. Lake Str.	.	71·06	
				9. Rapid	0·02	. . .	. .	. . .	.	71·51	2½ feet fall.
						No. 14. Lake .	5·35	. . .	0·70	71·53	
		No. 4. Décharge	0·05	. .	. .	. . .	. .	. . .	.	76·88	5 feet fall.
								14. Lake Str.	.	76·93	
No. 16. Portage . .	0·01	. .	. .	. .	. .	. . .	. .	. . .	.	77·63	
						15. L. Seiganagh	10·07	. . .	.	77·64	
17. Portage . .	0·01	. .	. .	. .	. .	. . .	. .	. . .	.	87·71	
						16. Swamp Lake	0·82	. . .	.	87·72	
18. Swamp Portage	0·24	. .	. .	. .	. .	. . .	. .	. . .	.	88·54	

Table of Portages, &c.—(continued).

Portages.		Décharges.		Rapids.		Lakes.		Lake Straits and Navigable Channels.		Distance from Lake Superior	Remarks.
	Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.	Statute miles.	
						No. 17. Cypress Lake	5·35	. . .		88·78	
No. 19. Portage . .	0·02	. . .	. .	. .	. .	. . .	. .	. . .		94·13	
						18. Knife Lake.	10·70	. . .	0·20	94·15	
20. Portage . .	0·04	. .	. .	. .	. .	. . .	. .	. . .	.	104·85	
								No. 15. Lake Str.	.	104·89	
21. Portage . .	0·09	. .	. .	. .	. .	. . .	. .	. . .	.	105·09	
						19. Lake .	0·60	. . .	.	105·18	
22. Carp Portage .	0·15	. .	. .	. .	. .	. . .	. .	. . .	.	105·78	
						20. Birch Lake.	4·00	. . .	.	105·93	
23. Portage . .	0·11	. .	. .	. .	. .	. . .	. .	. . .	.	109·03	
						21. Basswood L.	16·00	. . .	.	110·04	
24. Portage . .	0·10	. .	. .	. .	. .	. . .	. .	. . .	.	126·04	
								16. Lake Str.	0·25	126·14	
25. Fir Portage .	0·20	. .	. .	. .	. .	. . .	. .	. . .	.	126·39	
								17. Lake Str.	0·22	126·59	
				No. 10. Rapid	0·04	. . .	. .	. . .	.	126·81	3 feet fall.
								18. Lake Str.	0·35	126·85	
				11. Rapid	0·02	. . .	. .	. . .	.	127·20	2 feet fall.
								19. Lake Str.	1·50	127·22	
26. Portage . .	0·07	. .	. .	. .	. .	. . .	. .	. . .	.	128·72	
						22. Lake .	0·65	. . .	.	128·79	
27. Portage . .	0·09	. .	. .	. .	. .	. . .	. .	. . .	.	129·44	
						23. Crooked L.	16·80	. . .	.	129·53	
28. Curtain-Fall Por.	0·10	. .	. .	. .	. .	. . .	. .	. . .	.	146·33	
				12. Rapid	0·03	. . .	. .	. . .	.	146·43	3 feet fall.
						24. Iron Lake.	4·50	. . .	.	146·46	

Table of Portages, &c.—(continued).

Portages.		Décharges.		Rapids.		Lakes.		Lake Straits and Navigable Channels.		Distances from Lake Superior.	Remarks.
	Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.		Length in St. miles.	Statute miles.	
No. 29. Bottle Portage .	0·25	. .	. .	. .	. .	. . . .	. .	. . .	.	150·96	
						No. 25. Nequaquon L.	22·10	. . .	.	151·21	
30. Portage . .	0·12	. .	. .	. .	. .	. . . .	. .	. . .	.	173·31	
						26. Lake .	5·60	. . .	.	173·43	
31. Portage . .	0·15	. .	. .	. .	. .	. . .	. .	. . .	.	179·03	
								20. Lake Str.	0·50	179·18	
32. Portage . .	0·04	. .	. .	. .	. .	. . .	. .	. . .	.	179·68	
								21. Loon's Narrows.	7·60	179·72	
						27. Sand Point L.	9·67	. . .	.	187·32	
						28. Nameukan L.	5·20	. . .	.	196·99	
33. Nu Portage .	0·08	. .	. .	. .	. .	. . .	. .	. . .	.	202·19	
								22. Lakelet.	0·25	202·27	
34. Portage . .	0·14	. .	. .	. .	. .	. . .	. .	. . .	.	202·52	
								23. Lake Str.	5·20	202·66	
Total . .	15·33	Total .	0·66	Total. .	0·33	Total. .	160·62	Total .	30·92	207·86	Statute miles to Rainy Lake.

SYNOPSIS OF THE FOREGOING TABLE OF THE PIGEON RIVER ROUTE.

	Statute miles.	
Land Carriage	15·33	16·32 stat. miles Interrupted Navigation.
Décharges	0·66	
Rapids	0·33	
Lakes	160·62	191·64 stat. miles Navigable Water.
Lake Straits	30·92	

Aggregate distance . . 207·86 from Lake Superior to Rainy Lake.

Distance from Lake Superior to Rainy Lake, *viâ* the Kaministiquia Route, = 263·34 statute miles.

XIV.

*List of Photographs of Red River; the Churches of Selkirk Settlement; the Houses and Stores of the Settlers; Indian Tents and Graves; the Prairie; the Forts and Stores of the Hon. Hudson's Bay Company; the Native Races; and the Expedition returning to Crow Wing in Dog Carioles.**

THE RED RIVER.

View of Red River, from the Stone Fort.

View of Red River, from St. Andrew's Church, four miles above the Stone Fort.

Red River; Middle Settlement, eight miles below Fort Garry.

Freighter's Boat on the banks of Red River, seven miles below Fort Garry.

Bishop's Court (the residence of the Bishop of Rupert's Land,) on the banks of Red River.

(These Photographs exhibit the general character of the river.)

CHURCHES OF SELKIRK SETTLEMENT.

Cathedral of St. Boniface (Roman Catholic) and Nunnery, on the banks of Red River, opposite Fort Garry.

St. John's Church, two miles below Fort Garry. (Ch. of Eng.)

Presbyterian Church and Parsonage, seven miles below Fort Garry.

St. Paul's Church, Parsonage, and School House, eight and a half miles below Fort Garry. (Ch. of Eng.)

St. Andrew's Church (Rapids Church), sixteen miles below Fort Garry. (Ch. of Eng.)

St. Andrew's Parsonage.

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* These Photographs can be procured from Mr. J. Hogarth, No. 5, Haymarket, London. Price two guineas.

HOUSES AND STORES OF THE SETTLERS.

Residence of Mr. Bannatyne, near Fort Garry.

Mr. McDermot's Store, near Fort Garry.

Farm-houses and Windmills, Middle Settlement.

INDIAN TENTS AND GRAVES.

Ojibway Tents, on the banks of Red River, near the Middle Settlement.

Birch-bark Tents, west bank of Red River, Middle Settlement.

Indian Graves, covered with split sticks.

Indian Graves, covered with birch bark.

THE PRAIRIE.

The Prairie, on the banks of Red River, looking south.

FORTS AND STORES OF THE HONOURABLE HUDSON'S BAY COMPANY.

Fort Garry; at the confluence of Red River and the Assinniboine.

Hon. Hudson's Bay Company's Officers' Quarters: Lower or Stone Fort.

Fur Store: interior of Lower or Stone Fort.

NATIVE RACES.

John McKay: a Cree half-breed.

Letitia: a Cree half-breed.

Susan: a Swampy-Cree half-breed.

Wigwam: an Ojibway half-breed, Lake Superior.

An Ojibway Squaw with Papoose.

Red River Freighter's Boat.

Dog Carioles; Expedition returning to Crow Wing, by the winter road.

A Blackfoot Warrior's Robe, containing a history of his wars, &c., Buffalo hunts, and showing the number of scalps he has taken from his enemies.

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